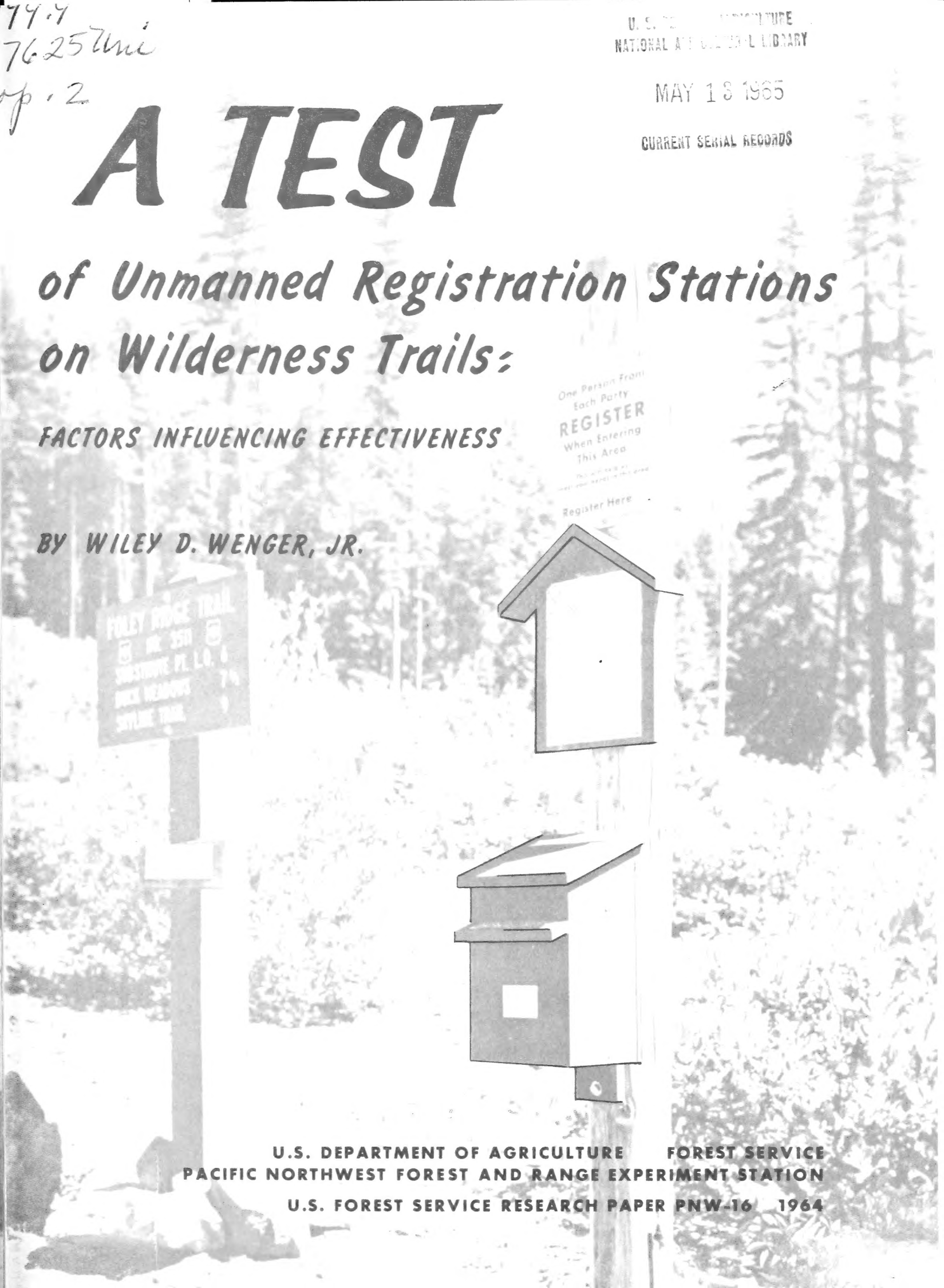
A TEST

of Unmanned Registration Stations on Wilderness Trails:

FACTORS INFLUENCING EFFECTIVENESS

BY WILEY D. WENGER, JR.



U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE
PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
U.S. FOREST SERVICE RESEARCH PAPER PNW-16 1964

U. S. FOREST SERVICE
Research Paper PNW-16

A TEST

of unmanned registration stations on wilderness trails: factors influencing effectiveness

By Wiley D. Wenger, Jr.

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
Philip A. Briegleb, Director
Portland, Oregon

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

NOVEMBER 1964

CONTENTS

INTRODUCTION

Better knowledge about wilderness recreation use is an essential base for better decisions on the allocation and management of land for wilderness recreation. On the one hand, the description of recreation use of a specific wilderness area can be immediately useful to the persons faced with maintaining the wilderness environment and deciding how to use money on trail building and maintenance, fire prevention, camp area maintenance and rehabilitation, control of animals and people, and information services to facilitate and enhance use. Such a description to be most useful immediately would include answers to such questions as: How much use does an area get? How is it distributed on the area? Where is overcrowding a problem? How long do people stay? What types of persons are using areas? Are they family groups, organizational groups, or other types of groups? What mode of travel do they use in the area? Are they likely to be familiar with the topography and weather patterns of the area? What recreation do they seek aside from "a wilderness experience"?

On the other hand, better descriptions of wilderness use are essential bases for sound research, which, in turn, is an essential base for better decisions allocating additional land for wilderness recreation, for crystallization of wilderness management objectives, and for long-range wilderness management planning.

On these larger issues, we need research in depth with samples of wilderness users. Samples used for most past wilderness studies have been merely convenience samples;[1] consequently, results, if extended, apply merely to mythical segments of the population as defined by the samples. But administrators are charged with making decisions to serve recognizable public segments, and researchers need to do a better job of basing their studies on samples that are representative of these "real" public segments. Such representative samples are difficult to obtain because wilderness users on any specific area are highly mobile, usually well diffused over a vast acreage, and well distributed in time. Furthermore, field access to them is slow and difficult, even uncertain.

The first problem, then, of obtaining a representative sample of a recognizable, or "real," population of wilderness users is to describe that population well enough to construct a sound sampling plan. An ideal description would include names and addresses of at least one member of each user group. Perhaps registration stations could be used to obtain this description from which needed samples for deeper research could be drawn.

Unmanned registration stations, or registers, have been a common sight for many years on forest recreation areas and trails (fig. 1). One of the more obvious objectives of the registers has been to obtain information about forest recreationists. How effective registers have been or might be for this goal is unreported in the literature, and opinions about their effectiveness vary widely from land manager to land manager. Because unmanned registration stations hold so much promise for obtaining information useful at various levels of wilderness administration and research, we judged it necessary to give them a fair and thorough testing on wilderness areas.

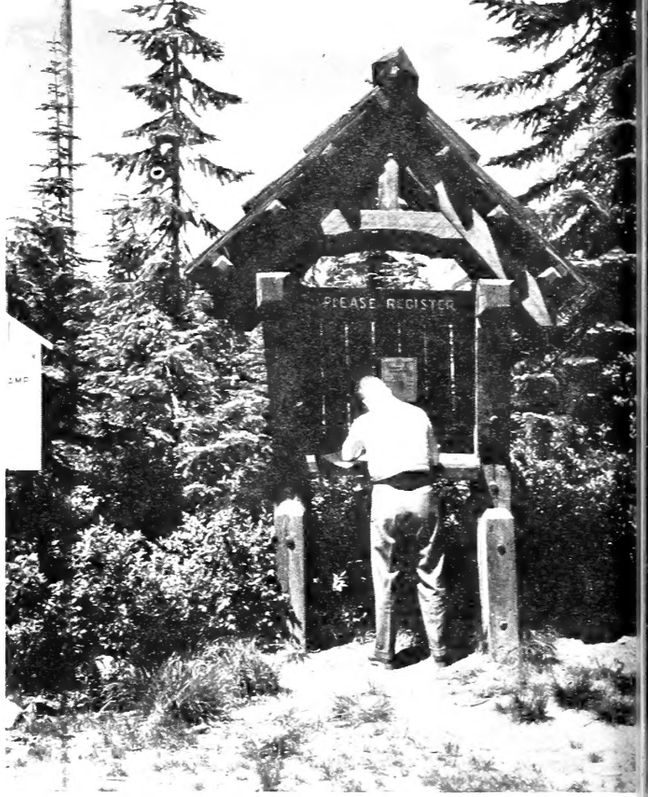
Our initial research on registration stations was aimed at evaluating the pros and cons about how stations should be designed. We also hoped to find out where stations could best

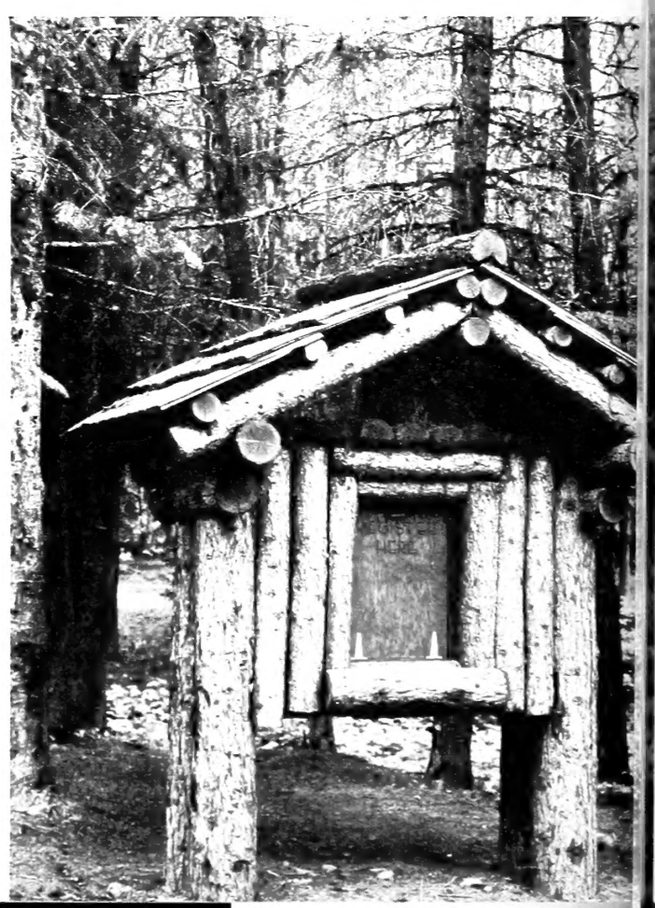
[1] The Wildland Research Center, University of California. Wilderness and recreation—a report on resources, values, and problems. ORRRC Study Rpt. 3, 352 pp. 1962.
Merriam, L. C., Jr. A land use study of the Bob Marshall Wilderness Area of Montana. Mont. Forest & Conserv. Expt. Sta. Bul. 26, 190 pp. 1963.
Taves, Marvin, Hathaway, William, and Bultena, Gordon. Canoe country vacationers. Minn. Agr. Expt. Sta. Misc. Rpt. 39, 28 pp., illus. 1960.

be located and what system for their use would work best. These issues are discussed in this report, which is written primarily for technicians and researchers who need better methods for obtaining information about wilderness recreation.

The general plan of this report is as follows: First, the study areas are described so that the reader can compare them with what areas he wishes to study; by such comparisons he might better make his own specific applications of our work. Second, our general research procedures are presented. Third, we describe the specifics of our formal experimentation with registration station designs and use the analytical rhetoric of statistics to compare the designs tested. Fourth, we temper the statistical conclusions on designs with a consideration of other factors not included in the statistical analyses. Fifth, factors of the location of stations and system of station use are discussed on the basis of our observations. Sixth, some cost factors are considered. Seventh, a general summary of our conclusions and recommendations is presented.

In other reports stemming from our 2 years of study, we will consider the technical aspects of converting registrations to useful information and will present information obtained about recreation use on the study areas.





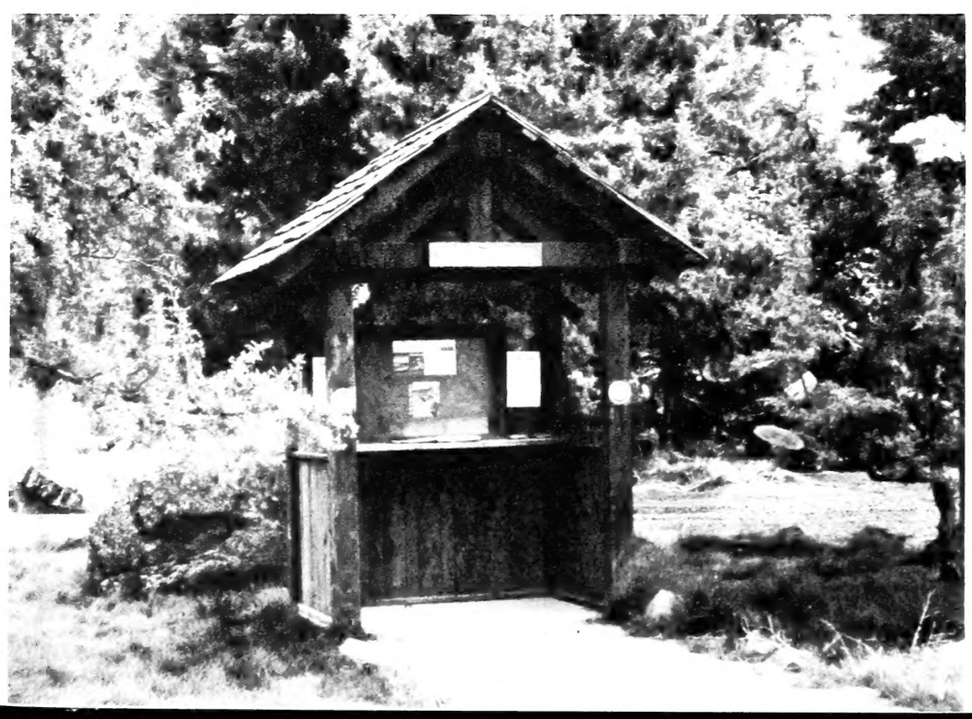


Figure 1.—Registration stations in general use vary in elaborateness of design. Usually, the response-eliciting signs say merely "please register," "register here," or perhaps only "registration."

Study Areas

The general application of our findings to other backcountry areas depends somewhat on the features on and about the areas of application. To permit the reader to compare his areas of interest with the areas involved in our studies, potentially relevant features of the study areas are described in this chapter of the report. Our methods of selecting the two study areas are also described.

"Wilderness" is a generic term which covers a wide range of environmental features. Although "wilderness" has generally come to mean at least "roadless backcountry" to wildland administrators, the term usually carries considerably more complex and variable meaning. For purposes of this study, however, a limited definition will suffice.

For use in this study, "wilderness" is operationally defined as an officially designated U. S. Forest Service wilderness-type area and contiguous roadless land area. The principal recognizable features of official Forest Service wilderness-type areas are described in Appendix A.

The study areas were selected at random from 10 Pacific Northwest areas which satisfied the following criteria (4 other areas were disqualified):

1. Generally representative of the region in pattern and class of use.
2. During the study period, subject to a pattern and class of use normally encountered on the area.
3. Used for several types of recreation.

Areas were selected at random to minimize possible bias influencing selection. The two areas selected were the Three Sisters Wilderness Area and the Mountain Lakes Wild Area. Both are in Oregon.

The Three Sisters Wilderness Area

The Three Sisters Wilderness Area is located along the crest of the Cascades halfway between the north and south edges of Oregon (fig. 2). The area includes about 197,000 acres, which extend approximately 32 miles north and south and approximately 15 miles east and west. The 53,000-acre tract of unroaded land contiguous to the area on the west side was also included as part of the total area studied. This tract made the study area a maximum of 28 miles wide (east and west).

The area is conveniently reached from the Eugene-Springfield or Bend-Redmond-Sisters areas. About 160,000 people live within 60 miles of the area.[2] Most of the perimeter of the area is accessible via paved or graveled roads.

The topography of the area is highly variable, ranging from extensive gentle slopes to challenging mountain peaks (fig. 3). Elevations range from 2,000 to 10,354 feet. Generally, trail access into the area from the west side is rugged, whereas trail access on the east side, which starts from a much higher base elevation, is extremely gentle.

About 60 access trails[3] lead into the area. These interconnect with a well-developed trail system which includes about 45 miles of the popular Oregon Skyline Trail. Access trails are well distributed around the perimeter. Only two short sections of the extensive perimeter are gentle and open enough to permit access off a well-defined trail.

A number of very popular lakes are adjacent to the area on the east and north sides, and

[2] Table 8, page 39-17, of U.S. Census of Population: 1960. Final Report PC(1)—39A. 1961.

[3] These include informal trails or clearly evident routes which are defined by use. A number of these are not on the official Forest Service trail system.

good fishing rivers are adjacent on the west side. The area is surrounded by roadside campgrounds. Three resorts and a pack station are adjacent to the area on the east side, where extremely heavy campground use occurs during the summer months.

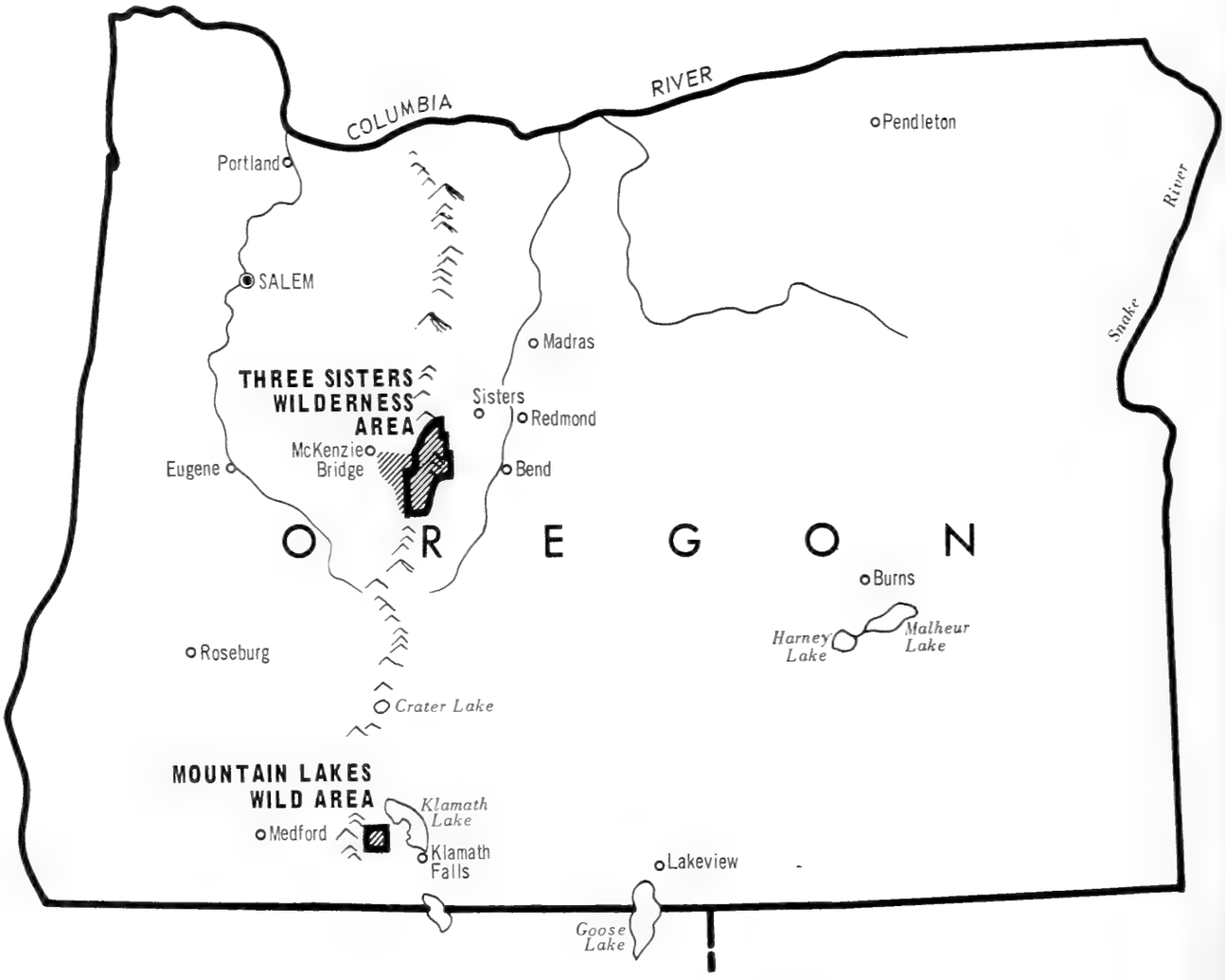


Figure 2.—The two study areas are located along the crest of the Oregon Cascades.

The Mountain Lakes Wild Area

The Mountain Lakes Wild Area includes about 23,100 acres of high country. It is located 3 miles east of the crest of the Cascades in southern Oregon between Medford and Klamath Falls.

A population of about 120,000 lives within 60 miles of the area.

The area was readily accessible from Klamath Falls over a paved highway and from Medford via Ashland over a paved highway except for about 6 miles of graveled road. Travel distance from Klamath Falls is about 25 to 35 miles (depending on access point) and from Medford, 30 to 40 miles. Unpaved forest roads provide access to trailheads from the paved highway which loops around the east and north sides of the area.

All users enter the area on six access trails. Trailheads are all well defined and are well distributed around the perimeter, with access trails leading in from all four sides of the area. Forest roads to the trailheads on the east and

Figure 3.—The Three Sisters Mountains provide rugged mountain scenery on the north half of the Three Sisters Wilderness Area.

Figure 4.—Lake Harriette is a principal point of attraction in the Mountain Lakes Wild Area.

south sides are hazardous for standard highway vehicles, but trailheads on the north and east sides are easily accessible.

The area is 36 square miles in the shape of a square. The contiguous unroaded acreage was not extensive and was being roaded and logged during the study period.

Elevations of the area range from about 5,000 to 8,200 feet. The boundaries include eight peaks over 7,500 feet. The mountains form a large rim about the heart of the area which includes numerous small lakes. The largest of these is Lake Harriette, the major point of attraction on the area (fig. 4). Although the area receives a deep snow accumulation during the winter, all but two small streams dry up during the late summer.

Pack and saddle stock are available at a pack station near the west boundary. However, the area is too small for long trips with stock, and forage on the area is extremely scarce.

Influences from adjacent recreation complexes would come largely from the Lake of the Woods which is 2 miles from the west boundary. Around this large lake are three organization camps, two popular forest camps, a resort, numerous summer residences, and a pack station. The developed campgrounds here are the only ones near the wild area. The principal recreation emphases at this lake are fishing, speed boating, and water skiing.

The features of these two study areas can be summed as follows: One is large, and one small. Both are within easy driving distance of moderately large population centers (for the Pacific Northwest). All sides of each area are readily accessible by road, with two sides of each being served by paved highways that are nearly adjacent to the officially designated wilderness boundaries; both areas have some gentle access trails leading to scenic attractions. A full spectrum of wilderness-type recreation activities is available between the two areas, and both areas have developed forest campgrounds on their perimeter. One area (the Three Sisters) is well known among backcountry enthusiasts; the other is relatively unknown.

These features offered considerable, desirable variation in our tests of unmanned registration stations on wilderness trails.

General Research Procedures

In this chapter, we describe the general design of the study and the specific methods of obtaining our data for evaluations. Later chapters discuss details on the data, analyses, and evaluations.

Overview of the Study Design

In both years of the study, the objective was to determine if unmanned registration stations might be designed and employed effectively to obtain use information from recreationists on wilderness trails. If registration stations seemed at all effective, we wished to know what physical factors seemed to contribute most to their effectiveness.

Registration stations were located on all entry trails at or near their junction with an access road. Signs requested that one person from each group register for the group. The registration forms asked several easily answered questions about the group.

How recreation groups responded to a station design was the criterion of its effectiveness. To determine group responses, we interviewed groups along the trail beyond the station. We also examined the quality of information obtained at the station. Evaluations of design and other factors of station use were made on the basis of statistical analyses and systematic observation.

The rest of this chapter will amplify the methods used for obtaining our data.

Terminology

Special terms used in describing the methods, data and the subsequent analyses are as summarized below:

Block—a geographic subunit:

Block I—west side, Three Sisters Wilderness Area,

Block II—east side, Three Sisters Wilderness Area, and

Block III—Mountain Lakes Wild Area.

Area—one of the two study areas.

Survey trail—one of the trails on which recreationists were interviewed.

Sampling unit—one group of trail users.

Treatment—a registration station with a specific combination of sign wording and box design:

Treatment number	Combination
1	Sign 1, card-type box
2	Sign 2, card-type box
3	Sign 3, card-type box
4	Sign 1, book-type box
5	Sign 2, book-type box
6	Sign 3, book-type box

Group or party—one or more persons traveling and/or camping together as a unit.

Group leader—in informally structured groups, a person who takes the initiative in registration or interviews, or both; in groups with established hierarchies, the regular leader, e.g., father of a family group, leader of a mountain climbing party.

Planned interviews—interviews with parties entering the study areas via a survey trail on the prescribed days for interviewing on that trail.

Special interviews —interviews outside the scope of the prescribed sampling plan for interviewing; includes interviews with leaving parties, parties on nonsurvey trails, and parties on survey trails on nonprescribed days.

Error—each discrepancy of registration data from actual fact in (1) number of groups, (2) number of individuals, (3) name-and-address combinations for registrants. (Errors are additive irrespective of direction.)

Repeater—a group containing one or more persons who had been exposed to a registration station on a trip to a study area prior to the trip of the interview.

Group visit—one trip to an area by a group of persons.

Individual visit—one trip to an area by one person. (A group of eight persons on one trip would count as one group visit and eight individual visits.)

Nonregistrant—a group that fails to register at a station.

Overregistration—registration of more groups or individuals in groups than were present on a trail; multiple registration by one group on one visit.

Registration Station Designs Location, and System of Use

The two elements of registration stations that seemed a priori most important to station success were selected for testing. These elements were (1) the sign requesting registration and (2) the method of storing completed registrations, that is, the style of registration box. In total, we tested six variations of registration station design in 1961. These variations consisted of all combinations of three differently worded signs and two different styles of form-holding box. In 1962, we tested one modified station design against 1961 designs.

Except for the two elements being tested, all stations were as similar in design as possible. Boxes were also designed to be adequate protection for forms against weather and animals. Two chained ballpoint pens and one pencil (unchained) were placed with each box. A small plastic calendar was fastened on the underside of the lid of each station in 1961 and on the top of the lid in 1962. All boxes were wood and finished with flat, dark-brown stain. All signs were made with silk-screened black letters on a yellow background; paints were waterproof enamel on tempered hardboard.

Stations were located on all known access trails on the perimeter of each study area (figs. 5 and 6). They were fastened to convenient trees or stumps or to posts set alongside the trail as close to the trailhead[4] as local conditions permitted.

Signs.—The 1961 sign wordings are as shown on page 9.

The signs varied in tone from mildly soliciting to mildly demanding. Variations were achieved by the use of the word "please" or "must" and by explaining or omitting the reasons for registering. Signs were otherwise as nearly alike as possible.

Signs were located above or otherwise as close to the registration boxes as possible so that they would be readily visible to persons approaching the station. When signs were not on the same tree or post as the station, they were located so that the box could also be seen by a person as he read the sign.

Boxes.—In 1961, we used two boxes (fig. 7). One box, called the card-type, was designed so that a registrant obtained a blank registration card by opening the lid and removing the form from the top section of the box. After completing it, he was instructed to drop it through a slot to the bottom section of the box. Access to the bottom of the box was achieved only by removing two phillips screws holding the inner separator between the bottom and top halves of the box. As a consequence, a person's replies to the questions on the registration form were protected from public view.

The other 1961 box, the book-type, was designed so that when a registrant lifted the lid he encountered a registration book, i.e., forms held in looseleaf binder rings. Upon completion of his registration, he would merely close the lid, leaving the information available to public scrutiny along with previous registrations.

Combinations of 1961 signs and boxes resulted in six design variations, or treatments, as presented in the terminology section.

[4] A trailhead is the point at which a trail begins, i.e., the junction of a road and trail.

ALL PARTIES MUST

REGISTER

WHEN ENTERING AND LEAVING THIS AREA

This will help us to :

Locate you in case of emergency at home
Plan and maintain trails for you
Meet your needs in this area
Protect this area for you to enjoy

GROUP LEADER, REGISTER HERE

Many thanks ! Have a pleasant trip !

U. S. FOREST SERVICE

Sign 2 X

ALL PARTIES PLEASE

REGISTER

WHEN ENTERING AND LEAVING THIS AREA

GROUP LEADER, REGISTER HERE

Many thanks ! Have a pleasant trip !

U. S. FOREST SERVICE

Sign 1 X

1961 SIGNS

1962 SIGN

ALL PARTIES MUST

REGISTER

WHEN ENTERING AND LEAVING THIS AREA

GROUP LEADER, REGISTER HERE

Many thanks ! Have a pleasant trip !

U. S. FOREST SERVICE

Sign 3

One Person From Each Party

REGISTER

When Entering This Area

This will help us meet your needs in this area

Register Here

U.S. FOREST SERVICE

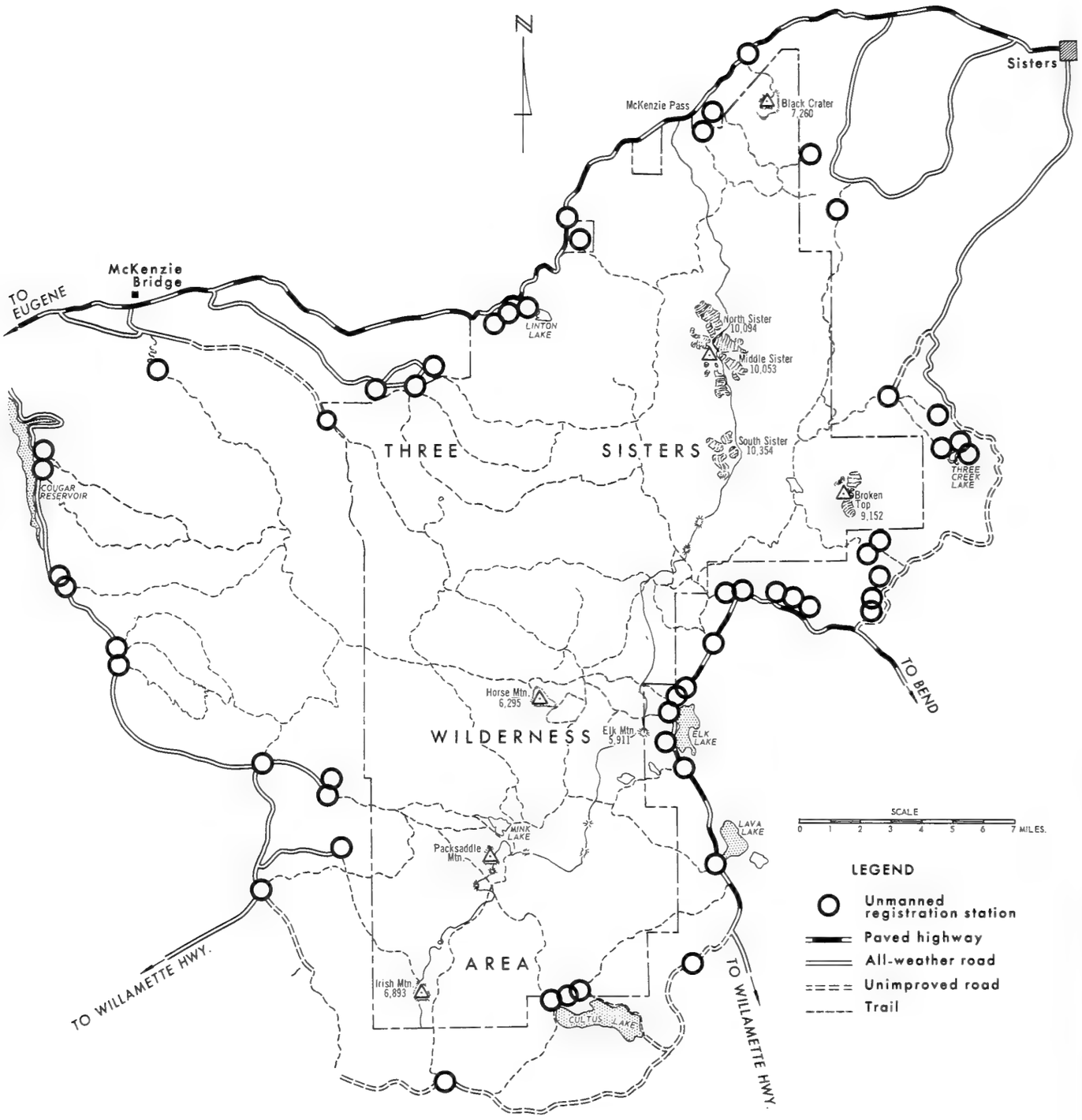


Figure 5.—All known access trails into the Three Sisters Wilderness Area and contiguous roadless area had a registration station at the trailhead.

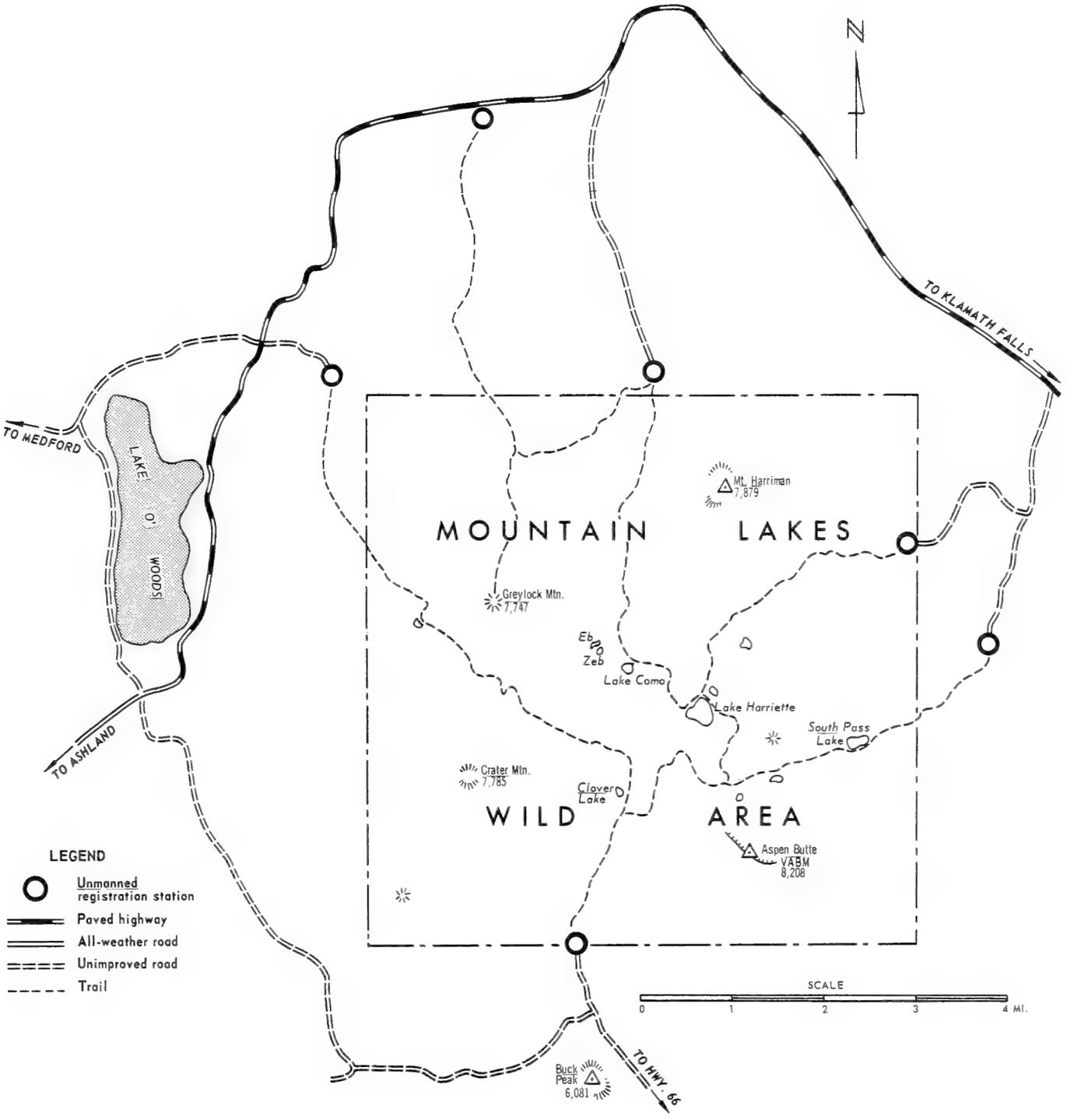


Figure 6.—All six of the trails into the Mountain Lakes Wilderness Area had registration stations at the trailheads.

Figure 7.—
Combinations of two different box designs and three response-eliciting sign designs were tested in 1961.

Registration forms for both types of boxes requested the same information. Wording and format were identical except that each sheet of the book-type form provided for three separate registrations (see page 14). Although the variable represented by forms was controlled as much as possible, the book-type form obviously created more visual impact and could be expected to stimulate most first-impression anxiety about what was expected of registrants.

Figure 8.—The station design tested in 1962 employed a map of the area as an additional service and attraction.

Registration cards were printed on IBM-type cards because (1) they were less costly to buy, print, and number than any other cardstock, and (2) a preliminary study of box dimensions showed that about three times the capacity could be handled if the forms were not folded before placing through the slot—people have generally been conditioned not to fold IBM-type cards. Heavy materials were used to permit use of forms when wet from exposure. Book-type forms were printed on 8-1/2- by 11-inch cover stock.

In 1962, we used but one registration station design with modifications based on 1961 tests. The most significant of these modifications were (1) a change in sign wording and (2) addition of a map as an integral part of the station. The registration form was also redesigned to improve clarity and gain additional information.

The sign wording in 1962 was firm in tone, though courteous, with no "frills" (page 9).

The card-type box was used in 1962 without significant modification. However, a plastic-laminated map of the principal area served by the particular access trail was mounted on a backing board above the registration box. The position of each particular registration station was marked on its map in words, "you are here," with an appropriate circle. The rationale of the maps, in addition to providing a needed service, was to increase the attraction of the station (fig. 8). Once a trail user had paused to look at the map, he might be more likely to register at the box in front of him.

Stations were located on trails as close to the trailheads as possible. An effort was made to cover every shortcut in addition to main trails. Additional registration stations were placed at the two pack stations serving the areas in 1962.

It was requested that each group be registered by one person. In 1961, groups were asked to register both when entering and leaving the areas. In 1962, only entering registration was requested.

REGISTRATION BOOK

Please answer all questions. One person only register for each group.

Name of group leader _____
Street or Box _____
City and State _____
Date _____ Time _____ ☐a.m. ☐p.m.

The number of persons in this group
16 years of age and older _____
younger than 16 years _____

The purpose of this trip is
(check one) ☐recreation
☐Forest Service work
☐other work _____ (what?)

(check one) ☐We are entering area
☐We are leaving area

(check one) ☐We are walking
☐We are riding horses
☐Other _____ (what?)

(check one) ☐We are backpacking
☐We are stock packing
☐We have no packs

We're going or have been in the area
(check one) ☐less than 1 mile
☐1 mile to 15 miles
☐more than 15 miles

Please answer all questions. One person only register for each group.

Name of group leader _____
Street or Box _____
City and State _____
Date _____ Time _____ ☐a.m. ☐p.m.

The number of persons in this group
16 years of age and older _____
younger than 16 years _____

The purpose of this trip is
(check one) ☐recreation
☐Forest Service work
☐other work _____ (what?)

(check one) ☐We are entering area
☐We are leaving area

(check one) ☐We are walking
☐We are riding horses
☐Other _____ (what?)

(check one) ☐We are backpacking
☐We are stock packing
☐We have no packs

We're going or have been in the area
(check one) ☐less than 1 mile
☐1 mile to 15 miles
☐more than 15 miles

Please answer all questions. One person only register for each group.

Name of group leader _____
Street or Box _____
City and State _____
Date _____ Time _____ ☐a.m. ☐p.m.

The number of persons in this group
16 years of age and older _____
younger than 16 years _____

The purpose of this trip is
(check one) ☐recreation
☐Forest Service work
☐other work _____ (what?)

(check one) ☐We are entering area
☐We are leaving area

(check one) ☐We are walking
☐We are riding horses
☐Other _____ (what?)

(check one) ☐We are backpacking
☐We are stock packing
☐We have no packs

We're going or have been in the area
(check one) ☐less than 1 mile
☐1 mile to 15 miles
☐more than 15 miles

BUDGET BUREAU NO.40-6132
APPROVAL EXPIRES 6/30/62

Interview Sample Survey Plans

By interviewing trail users beyond the stations, we were able to make direct field comparisons of actual and registered use. Stations could not be checked continuously. Consequently, the most serious problem in the use of interviewers was to obtain representative estimates of responses at a feasible cost.

The sampling plans were designed to eliminate the maximum number of experimenter biases and to give each group an equal chance of occurring in the sample. Lacking perfect information about the factors affecting groups' responses and the occurrence of types of groups over the areas, we used a plan that best seemed to randomize these factors and thereby to result in a sample representative of all area users.

One major difference between the 1961 and 1962 sampling plans stemmed from the need to minimize trail-associated bias in our test of 1961 designs. The other major difference was in our basis for selection of trails on which to interview—in 1961, we selected six trails at random on each block (see "Terminology," page 7); in 1962, we interviewed only on trails with a minimum expected use of one group per day.

Groups were the basic population elements because responses were measured on groups. Field conditions made it necessary to sample the population in clusters of groups, but field conditions also made it seem reasonable to assume group responses to be independent of one another.[5]

Details of each year's plan are described below.

1961 PLAN

Each 1961 sample group could not be exposed to all six treatments (see "Terminology," page 7), and, indeed, memory of prior treatments would confound all but first responses; consequently, responses were measured on groups in independent subsamples for each treatment.

Unique factors associated with specific trails could influence group responses at stations. To prevent confounding the response variable, we did the following in the sampling plan:

1. Equal interview time was allowed to each trail used in the survey.
2. On each survey trail, treatments were rotated so that each treatment occurred on each trail for one interview period; with six treatments, we had six interview periods on each survey trail.

Interviewer time was limited by costs; accordingly, the number of survey trails was limited to six on each block. This number permitted a balanced sample design on each block—six treatments by six trails—which spread our available time out over the maximum possible number of trails.

The six trails were selected at random within each block on the Three Sisters Wilderness Area (a selection of 12 trails out of the known 45). All six trails of Block III (corresponding to the Mountain Lakes Wild Area) were used. Only trails a mile or more in length or connecting with other interior trails were included in the trail population from which sample trails were drawn.

In 1961, interviewing was conducted in periods evenly spread from the early part of June to late October. Such a long season was used to obtain responses from all classes of user groups, from early fishing to elk hunting groups, and thereby to test the stations with a full diversity of recreationists.

The 1961 interview periods on each trail were from 8 a.m. to 4 p.m.

Initially, then, six trails were used in the survey on each of the three geographically distinct blocks. Block III was dropped midway through the study because of trail use too light to obtain sufficient interviews. In total, interviewers spent 92 days on survey trails in 1961.

Because of the failure to encounter users during some interview periods, the balanced design of the experiment suffered, and the overall sample was considerably smaller than hoped for. Fortunately, data were collected for each treatment on each block of the Three Sisters Wilderness Area, and data collected were sufficiently

[5] Readers who wish a fuller discussion of this assumption may request a report being prepared on survey methodology used with registration stations on wilderness areas.

well distributed among trails to permit generalizing to all trails on the area. Because of the small sample size, only large differences between treatments would likely be indicated by the statistical analyses.

1962 PLAN

The 1961 sampling plan was designed around the experimental test of design variations. In 1962, one "standard" design was used and was compared with designs used in 1961. The comparison was less rigorous than that between treatments in 1961, but provided some basis for evaluating the general effect of 1962 modifications.

In the 1962 sampling plan, an attempt was made to improve the efficiency of sampling. Accordingly, predicted use of trails for 1962 was calculated from 1961 registration data. Ten trails were purposively selected from the 16 trails having an average use of at least one group per day. The 37 interview periods available were all assigned to these 10 trails[6] in about equal numbers by random drawing. Interview periods included 25 weekend-days and holidays and 12 weekdays. Each period was from 8 a.m. to 3 p.m.

Interviews were obtained from all entering and leaving groups encountered during interview periods, except that no group was interviewed more than once during a visit.

Collection of Information about All Stations

Information was also collected periodically throughout the field seasons from and about all registration stations—not only those used in the sample survey. All completed registration forms were collected, observations about vandalism and other elements of interest were made, and necessary maintenance was done to restore the stations to good condition. From this information, we derived quantified measures of three factors which we used in making additional comparisons of 1961 designs. These factors were vandalism to stations, accuracy of key items on forms, and spurious comments on forms. Specifics of this data categorization are discussed with the presentation of analyses.

The statistical analyses considered only those aspects of response to designs which could be quantified. They represented but one type of evidence, albeit a powerful one, which assumed adherence to formally prescribed rules. Adherence to the formal models is rarely perfect, however, and other types of evidence are frequently of value, too, if carefully gathered and used. To supplement our statistical analyses in this study, intensive observations relevant to use of stations were made throughout the field seasons by the author and his assistant. The same two people handled the study both years and were able to make numerous informal manipulations of equipment, tests, and specific observations to follow up hunches about how people responded to the stations. Care was always made in these informalities not to influence, or disturb, the formal aspects of the study. Abundant notes and records of our observations were made during both seasons; these informal findings were used to temper and supplement the formal statistical comparisons and will be presented following the statistical analyses.

[6] By 1962, a total of 53 trails were known on the Three Sisters Wilderness Area and 6 on the Mountain Lakes Wild Area. All known trails had registration stations on them for collecting use information on the study area. The 10 sample survey trails were all on the Three Sisters Wilderness Area.

Statistical Analyses of Station Design

Through the statistical analyses, we tried to learn which sign and box design resulted in the most desirable responses of recreation groups. Comparisons of signs and boxes were made in 1961, using data from two basic sources: (1) the interview sample survey and (2) information from all stations.

A series of nine analyses was made of data from the first source, and three from the second source. These analyses are discussed in sections entitled, "1961 Interview Sample Survey","Information from All 1961 Stations", and "Discussion of the 1961 Statistical Analyses." In 1962, a modified station design was compared for effectiveness with all but one 1961 design, and the analyses are discussed in the section, "The Effectiveness of 1962 Design Modifications." Data on the 1962 design came entirely from the 1962 interview sample survey.

1961 Interview Sample Survey

Interviewers collected information about (1) the response of each sampled group at particular stations and (2) a few characteristics of each group, including whether or not group members had previously been on trails with registration stations. In this section, we present details of the type of data collected, the rationale of the ways we aggregated the sample, and the results of the series of data analyses.

The sampling plan resulted in a smaller sample size than we had hoped for, and by the middle of the 1961 season, we began to seek "unplanned," or "special," data sources in addition to those in the plan. The plan had specified that "entering" groups would be included in the sample; to add to our "special" sample, we began to interview "leaving" groups not previously interviewed. We compared these latter interviews with information on the registration stations at the time and place groups had purported entering. If overregistration by groups had occurred frequently, errors would have been underestimated by the incorporation of this special interview data into that from the planned sample; however, our experiences with groups interviewed by plan indicated very little overregistration—the bias from this source in special interviews seemed likely to be negligible. Other special interviews were obtained by interviewing on five trails not in the planned sample and by interviewing a few extra days on planned trails. To preserve the rigor of our planned survey, yet use all our survey data, separate statistical analyses were made with and without the special data.

Another separation of the total obtained sample seemed necessary because of the occurrence of "repeaters" in the sample. Repeaters were those groups who had encountered a station on some visit prior to that on which interviewed (no groups were interviewed more than once). The initial perception of stations by repeat visitors might have carried over to subsequent visits, even though different treatments were encountered on return trips. To be free of this confounding variable, planned data analyses were also made with repeater data removed.

A summary of interviews obtained in each of the sample aggregations is shown in table 1.

Three measures of responses were derived from comparisons of interview and registration information for each group:

1. The number of registered groups for each interviewed group.

2. The number of individuals reported by each group on the registration form and the number actually seen in the group.
3. The apparent accuracy of the name and address of each group registrant.

Table 1.—Summary of interviews obtained by blocks

Item	Block			Total
	I	II	III	
Number of interviewer days	35	41	16	92
Number of interviews:				
Planned	38	15	0	53
Special	7	[1]28	6	41
Total	45	43	6	94
Number of individuals in groups:				
Planned interviews	128	57	0	185
Special interviews	29	[1]118	36	183
Total	157	175	36	368
Number of repeaters:				
Planned interviews:				
Groups	9	7	0	16
Individuals in groups	35	18	0	53
Special interviews:				
Groups	4	[1]13	2	19
Individuals in groups	21	[1]53	7	81
Total:				
Groups	13	20	2	35
Individuals in groups	56	71	7	134

[1] Includes 3 groups observed that were not interviewed—a total of 10 individuals.

The comparisons were quantified in terms of the error effect on registration information as follows:

1. Group errors—the error in registered number of groups resulting from a group's response. If a group registered properly, its error score was "0." Groups that failed to register were scored "1." If more than one registration was left by a group at one time, its score was the number of surplus registrations.
2. Individual errors—the total number of individuals erroneously reported by a group when responding at a particular time.
3. Name-and-address errors—the number of erroneous, incomplete, or surplus name-and-address combinations resulting from a group's response.

Errors were summed irrespective of the sign of each; it was irrelevant in the comparison of treatments whether an error stemmed from too much or too little registration information.[7]

The total sample data are shown in tables 2, 3, 4, and 5.

The distributions of errors were discrete, nearly binomial, and highly skewed; the number of groups and persons encountered on each treatment was highly variable; and the quantity of data was clearly less than optimum. Use of a nonparametric test for analyses of these data seemed preferable, as the requirements for the distribution are less severe and the potential for generalization is greater than with parametric tests.

Table 2.—Number of group errors

Number of groups	Errors per group	Total errors
64	0	0
28	1	28
1	2	2
1	3	3
94	--	33

Table 3.—Number of name-and-address errors

Number of groups	Errors per group	Total errors
59	0	0
32	1	32
2	2	4
1	3	3
94	--	39

Table 4.—Number of individual errors

Number of groups	Individual errors per group	Total individual errors
55	0	0
7	1	7
10	2	20
10	3	30
7	4	28
2	5	10
2	6	12
1	17	17
94	--	124

Table 5.—Mean number of individual errors per individual per group

Number of groups	Mean errors
55	0.000
1	.100
1	.250
1	.266
2	.500
1	.667
32	1.000
1	2.000
94	--

[7] On the other hand, adjustments of data to obtain use estimates must be based on algebraic summation of errors.

The Kruskal-Wallis test was appropriate. Assuming that each group was independent, we computed the statistic H from the rank error score for each. The usual correction for ties in rank scores was made. The probability of an H as large or larger occurring by chance was determined by use of a chi-square table[8].

The analyses were made to determine if the frequency of errors was significantly different for different boxes, different signs, and, when data was sufficient, for different blocks. If the probability was less than 5 in 100 that a population difference occurred, the error frequency in a particular test was concluded to be significantly associated with the design or blocks involved.

The same statistical techniques were used for each of the error types—group, individual, and name-and-address—by each of the sample aggregations. The three sample aggregations were as follows:

Data source numbers	Data sources
1	Planned interviews
2	Planned interviews except repeater groups
3	All interviews except repeater groups

In interpreting the analyses, most emphasis, or weight, was given to those analyses on sample aggregations with the best control of extraneous and confounding influences. Ranked highest in interpretation were the analyses on data source 2, second were analyses on data source 1, and third were analyses on data source 3.

A detailed example of the application of the Kruskal-Wallis test is presented in Appendix D with data and summaries of all analyses. Conclusions are summarized below by type of error and data source:

[8] Siegel, S. Nonparametric statistics for the behavioral sciences. 312 pp. New York: McGraw-Hill Book Co., Inc. 1956.

Data source	Most effective design: Box No.	Most effective design: Sign No.
For group errors:		
Planned	2	([1])
Planned minus repeaters	2	([1])
Planned plus special minus repeaters	([1])	([1])
For individual errors:		
Planned	2	([1])
Planned minus repeaters	([1])	2, 3
Planned plus special minus repeaters	([1])	2, 3
For name-and-address errors:		
Planned	2	([1])
Planned minus repeaters	2	2, 3
Planned plus special minus repeaters	([1])	2, 3

[1] Sample differences between designs are statistically nonsignificant.

Fewer group registration errors occurred on box 2, the book-type box, than on box 1, the card-type box. Sign wording seemed to have little effect on group registration errors in this test.

Signs 2 and 3, the most firmly toned signs, yielded fewer individual registration errors than sign 1, the least firmly toned one. But the weight of evidence indicated that box differences were not significant in effect on these errors.

Fewer name-and-address errors occurred on box 2 than on box 1 and on signs 2 and 3 than on sign 1.

On the basis of the sample survey, significant differences were indicated often enough and consistently in the same direction so that it seemed reasonable to assert that box 2 and either sign 2 or sign 3 were the most effective designs for obtaining information on the number of group visits, number of individual visits, and names and addresses of registrants. The analyses of the frequency of errors that occurred on block I and block II indicated that no significant differences existed between these blocks; therefore, the conclusions were not influenced by block differences.

The data are rearranged and presented in tables 6 to 8 to show the percentages of groups and individuals registered for selected sample aggregations[9]. Two most striking features of these tables are (1) the percentage registered on box 1-sign 1 is markedly lower than for all other combinations and (2) except for the box 1-sign 1 combination, percentages registered are all high—between 78 and 100 percent. The Kruskal-Wallis test was incapable of testing interaction between boxes and signs, but it seemed from the percentages shown that the box 1-sign 1 combination was probably responsible for both box 1 and sign 1 being significantly inferior in the foregoing analyses. We could not see, from other inspection of the raw data, any peculiarities that might explain the probable interaction with box 1 and sign 1.

[9] In these tables, percent registered reflects compensating errors, i.e., overregistration canceled underregistration on a 1-to-1 basis.

Table 6.—Registration of groups (planned interviews less repeaters), by various combinations of boxes and signs

Sign No.	Box 1			Box 2			Total		
	Actual	Registered		Actual	Registered		Actual	Registered	
	Number	Number	Percent	Number	Number	Percent	Number	Number	Percent
1	7	3	42.8	7	6	85.7	14	9	64.3
2	5	4	80.5	11	11	100.0	16	15	93.8
3	1	1	100.0	6	5	83.4	7	6	85.7
Total	13	8	61.5	24	22	91.7	37	30	81.2

Table 7.—Registration of groups (planned plus special interviews less repeaters), by various combinations of boxes and signs

Sign No.	Box 1			Box 2			Total		
	Actual	Registered		Actual	Registered		Actual	Registered	
	Number	Number	Percent	Number	Number	Percent	Number	Number	Percent
1	[1]10	4	40.0	[1]7	6	85.7	17	10	58.8
2	[2]7	6	85.7	[1]15	13	86.7	22	19	86.4
3	[3]3	3	100.0	[4]17	15	88.2	20	18	90.0
Total	20	13	65.0	39	34	87.2	59	47	79.7

[1] Includes one horseback group of four persons not registered.
[2] Includes two horseback groups of nine persons registered.
[3] Includes one horseback group of four persons registered.
[4] Includes two horseback groups of 21 persons—23 persons were recorded. Also includes one party of four persons on two trail motorscooters not registered.

Table 8.—Individuals registered (planned plus special interviews less repeaters), by various combinations of boxes and signs

Sign No.	Box 1			Box 2			Total		
	Actual	Registered		Actual	Registered		Actual	Registered	
	Number	Number	Percent	Number	Number	Percent	Number	Number	Percent
1	[1]38	6	15.8	[1]23	18	78.3	61	24	39.3
2	[2]28	25	89.3	[1]66	52	78.8	94	77	81.9
3	[3]13	13	100.0	[4]66	59	89.4	79	72	91.1
Total	79	44	55.7	155	129	83.2	234	173	73.9

[1] Includes one horseback group of four persons not registered.
[2] Includes two horseback groups of nine persons registered.
[3] Includes one horseback group of four persons registered.
[4] Includes two horseback groups of 21 persons—23 persons were recorded. Also includes one party of four persons on two trail motorscooters not registered.

In summary, the 1961 interview survey analyses indicate the following:

1. More groups registered at book-type registration stations than card-type. Sign tone seems to have had little effect on whether or not groups registered.
2. Once groups stopped to register, they tended to do a more accurate job of reporting the number of individuals and the names and addresses of the group leaders at stations with the more firmly toned signs.
3. Names and addresses tended to be reported more accurately at book-type stations than card-type.
4. The poor response to the mildest sign combined with the card-type box probably contributed heavily to the foregoing results.

In general, use of the book-type box and either of the two most firmly toned signs resulted in the best responses. But it is likely that the only significantly inferior design was the combination of the card-type box with the mildly toned sign. Other evidence influencing our final judgments will be discussed in the next section.

Figure 9.—Vandalism was regarded as any act damaging to the station or registration forms. In 1961, there were only 3 percent as many acts of vandalism as number of registrations.

Information from All 1961 Stations

The previous analyses considered only information obtained during interviewing periods on survey trails. In this section, we discuss analyses of information obtained from and about all registration stations for the entire 1961 season. We consider here the potential association with station design of (1) vandalism, (2) the completion and accuracy of registration, and (3) the frequency of nonconstructive comments, or "junk," on registrations. Separate analyses were made for each type of information.

THE OCCURRENCE OF VANDALISM

Vandalism to unattended equipment exposed to large numbers of people seems inevitable. Special concern seems justifiable only when vandalism occurs at an unusually high rate for the class of equipment.

Presumably, the rate or intensity of vandalism on a station could be influenced by factors associated with the design. For example, a sign wording too forceful or severe to tone could, perhaps, lead to frequent retaliation via vandalism of the station. Consequently, it seemed important to consider vandalism rates in the evaluation of station designs. Careful records were kept of acts of vandalism on each station. A statistical analysis was made to compare rates between designs.

For this study, vandalism was operationally defined as any act damaging to the registration station or associated equipment, including the forms (fig. 9). However, verbal or nonverbal scribbling or "junk" on only one or two forms was not classified as vandalism but was considered in a separate analysis.

The criterion for damage was whether or not the act reduced or destroyed the physical or psychological effectiveness of the station. For example, if all of the forms were removed or

stuffed into the lower section of the card-type box, registration for others was obviously impeded. If the box or signs were scribbled on or defaced in other ways, the aura of the station would be damaged, the station would be less likely to be taken seriously by others, and other acts of vandalism would likely be stimulated.

Acts of vandalism were carefully described and counted each time a station was serviced. At the same time, a count was made of all group registrations occurring since the last servicing. The number of acts of vandalism were, therefore, linked with the number of group registrations during the period the vandalism occurred. (Time periods between servicings were unequal.) Seriousness of the effect on registration of the vandalism acts was thereby automatically weighted roughly; a serious act would be more likely to reduce the number of registrations occurring during the time period and would thereby increase the ratio or number of acts to number of registrations. On the other hand, the more use a trail received, the higher the number of registrations and also the more acts of vandalism that would likely occur. Interaction between number of acts and registrations is apparent either way.

An analysis of covariance was used to remove the effects of varying numbers of registrations on the frequency of vandalism occurring on each treatment and to test the association of vandalism with design. All trails on both study areas were included in one analysis; a separate analysis was also made of the Three Sisters Wilderness Area alone. On both areas, a total of 164 vandalism acts occurred with 5,154 registrations. The number of acts of vandalism and number of registrations occurring by treatments is shown in table 9. The ratios of acts to registrations are also shown in table 9 as an indication of the vandalism rate.

The results of the analyses are summarized in tables 10 and 11. A greater than 5-in-100 chance existed that no significant difference in the number of vandalism acts occurred with different treatments. Interaction between signs and boxes was similarly nonsignificant. Consequently, it is concluded that neither box nor sign designs influenced the rate of vandalism at stations. A decision about best design should be made on the basis of other factors.

Table 9.—Numbers of vandalism acts and registrations and the ratio of acts to registrations, by treatments

Treatment	Box 1			Box 2			Total		
	Acts	Registrations	Ratio	Acts	Registrations	Ratio	Acts	Registrations	Ratio
	Number	Number		Number	Number		Number	Number	
Sign 1	35	803	0.044	14	440	0.032	49	1,243	0.039
Sign 2	40	1,122	.036	21	659	.032	61	1,781	.034
Sign 3	32	865	.037	22	1,265	.017	54	2,130	.025
Total	107	2,790	.038	57	2,364	.024	164	[1]5,154	.032

[1] More registrations than registered groups occur because groups were asked to register both when entering and leaving.

Table 10.—Summary of covariance analysis of vandalism acts: Three Sisters Wilderness Area, 1961

Source	d. f.	F	$F_{.05}$	P
Adjusted boxes (b)	1	<1	6.61	>.05
Adjusted signs (s)	2	2.78	5.79	>.05
Adjusted b X s	2	2.77	5.79	>.05
Within error	5	--	--	--

Table 11.—Summary of covariance analysis of vandalism acts: both study areas 1961

Source	d. f.	F	$F_{.05}$	P
Adjusted boxes (b)	1	3.54	4.84	>.05
Adjusted signs (s)	2	1.96	3.98	>.05
Adjusted b X s	2	1.30	3.98	>.05
Within error	11	--	--	--

THE COMPLETION AND ACCURACY OF KEY ITEMS

Analysis of registrant performance on forms was another way of analyzing effectiveness of station designs. Accordingly, registrations were evaluated for completion and prima facie accuracy of key registration items: name and address, date and time of registration, and number of individuals in the group.

The completion-accuracy classes were as follows:

1. All key items seem complete and accurate.
2. No registration or else registration incoherent.
3. Name and/or address too incomplete or inadequate to send mail to the registrant.
4. Date and/or time incomplete or inaccurate.
5. Number of individuals was not stated or was inaccurate.
6. Combination of categories 3 to 5.

Each group with a registration card or interview schedule was assigned to one cell of the two-way (treatment x completion-accuracy class) table. If a group made more than one key omission or error, it was assigned to a "combination" cell.

Chi-square analyses were used to test for significantly different rates of completion and accuracy on different treatments. Observed differences were deemed significant if there was less than a 5-in-100 chance of their occurring because of random sampling errors. The frequency of occurrence of groups in completion-accuracy classes is shown by treatments and blocks in table 12.

The analyses indicated the following:

1. Registration completion and accuracy were not significantly different for different box designs (chi-square: 7.00, 5 d.f., $0.30 > P > 0.20$).

2. Different sign designs did elicit different rates of completion and accuracy of registrations (chi-square: 19.68, 10 d.f., $0.05 > P > 0.02$). More incomprehensible cards, or registration failures, were detected for sign 1 than for either sign 2 or sign 3 (contribution of 11.22 to preceding chi-square of 19.68). Sign 2 elicited the most accurate registration on all key items (chi-square: 14.90, 4 d.f., $0.02 > P > -0.01$).[10]

3. Registration accuracy was not significantly different between geographical blocks of the study areas (chi-square: 16.94, 10 d.f., $0.10 > P > 0.05$).

[10] Chi-square was determined for the three signs times completion-accuracy classes 1, 2, and 3 to 5 combined.

Table 12.—Frequency of groups in completion-accuracy classes by boxes, signs, and blocks

Item	Completion-accuracy classes													
	1 Correct		2 No registration		3 Name-address		4 Date-time		5 Individuals		6 Combination		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Box 1	1,260	77	49	3	51	3	106	7	68	4	95	6	1,629	100
Box 2	1,416	77	57	3	67	3	121	7	92	5	76	4	1,829	[1]99
Total	2,676	--	106	--	118	--	227	--	160	--	171	--	3,458	--
Sign 1	619	75	40	5	27	3	55	7	44	5	39	5	824	100
Sign 2	894	80	28	2	31	3	71	6	52	5	47	4	1,123	100
Sign 3	1,163	77	38	2	60	4	101	7	64	4	85	6	1,511	100
Total	2,676	--	106	--	118	--	227	--	160	--	171	--	3,458	--
Block I	1,134	75	53	4	50	3	108	7	89	6	75	5	1,509	100
Block II	1,426	79	49	3	66	4	108	6	66	4	89	5	1,804	[1]101
Block III	116	80	4	3	2	1	11	8	5	3	7	5	145	100
Total	2,676	--	106	--	118	--	227	--	160	--	171	--	3,458	--

[1] Failure to total to 100 resulted from rounding errors.

THE FREQUENCY OF NONCONSTRUCTIVE COMMENTS

Another type of performance on registration forms might also have reflected station design variations—the frequency of occurrence of nonconstructive comments, or "junk." "Junk" probably occurs for reasons similar to those causing vandalism.

Single, torn forms were also classified with nonconstructive comments if indicative of irritation or a changed mind about registration. "Junk" was classified as follows:

1. None
2. Nonsensical lines
3. Sensical but innocuous
4. Vulgar; lewd
5. Form torn as result of irritation or a changed mind about registration (usually shredded after completion of several items).

Each registered group was classified and assigned to one cell in two-way tables (treatment x "junk" class). Chi-square analyses were made of the tables. Observed differences were deemed significant if there was less than a 5-in-100 chance of their occurring because of random sampling errors. The frequency of nonconstructive comments is shown in table 13.

The chief conclusions from the analyses are as follows:

1. About as much "junk" occurred with one type of box as the other (chi-square: 5.51, 3 d.f., $0.20 > P > 0.10$).
2. Signs 1 and 3, the signs without reasons for registering, elicited more nonsense and innocuous "junk" than sign 2 (chi-square: 9.23, 3 d.f., $0.05 > P > 0.02$).

The following tendencies are also apparent, although they are either not testable or not significant at the 5-percent level:

1. Sign 3 tended to elicit more "junk" than sign 2 but less than sign 1.
2. Block III tended to elicit more nonsense and innocuous "junk" than blocks I and II.

Vulgar comments, lewd comments, and torn forms resulting from irritation or changed minds about registration occurred with less than 1 percent of registrations. These types of "junk" appeared about as frequently on one treatment and block as others. The general infrequency of all types of nonconstructive comments are further indication of the willingness of trail users to cooperate at registration stations. Nonconstructive comments appeared on only 4 percent of the group registrations.

The mildly toned ("please") sign elicited more "junk" than the other signs, possibly because it was not as commanding of respect. The firmly toned ("must") sign which stated no reasons for registering elicited less "junk" than the mildly toned sign but more than the sign that was firmly toned but also provided reasons for registering.

Table 13.—Frequency of nonconstructive comments ("junk") on group registration cards, by boxes, signs, and blocks

Item	Classes of nonconstructive comments									
	1 None		2 Nonsense		3 Innocuous		4 - 5 Severe		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Box 1	1,571	96	20	1	31	2	7	0.4	1,629	99
Box 2	1,746	95	20	1	57	3	6	.3	1,829	99
Total	3,317	--	40	--	88	--	13	--	3,458	--
Sign 1	779	95	14	2	27	3	4	.5	824	100
Sign 2	1,093	97	7	1	19	2	4	.4	1,123	99
Sign 3	1,445	96	19	1	42	3	5	.3	1,511	100
Total	3,317	--	40	--	88	--	13	--	3,458	--
Block I	1,439	95	20	1	45	3	5	.3	1,509	99
Block II	1,745	97	17	1	35	2	7	.4	1,804	100
Block III	133	92	3	2	8	6	1	.7	145	100
Total	3,317	--	40	--	88	--	13	--	3,458	--

SUMMARY OF CONCLUSIONS

The three foregoing sets of analyses contributed the following to our accumulated evidence on effectiveness of registration station designs:

1. Vandalism was not associated with the specific designs of either signs or boxes.
2. Degree of completion and accuracy of key registration items was associated with designs of signs but not of boxes. The firmly toned sign which provided reasons for registering (sign 2) was the most effective. The mildly toned sign (sign 1) yielded the poorest responses, and the most firmly toned sign (sign 3) was intermediate in effectiveness.
3. The firmly toned sign with reasons (sign 2) was the least productive of nonconstructive comments, or "junk," on registration forms; the mildly toned sign (sign 1) elicited the most.
4. In general, the vandalism rate on stations was 3.2 acts per 100 registrations, a figure we judged to be quite tolerably low.
5. Although numerous omissions and errors occurred on registration forms, most registrants seemed to answer the form items willingly. (Improvements in form design might have improved response to specific items.)
6. "Junk" occurred on but 4 percent of the registrations, and a mere 13 of 3,458 registrations indicated hostility via vulgar or lewd comments or a form torn after a person had begun to register.

Discussion of the 1961 Statistical Analyses

The statistical analyses in 1961 represent four different types of systematic observations of differences in response occurring at registration stations. Probability statements based on standard statistical techniques were made about these observations. These probability statements help to estimate the chances of our overall evaluation being correct: they yielded evidence to help make decisions. Evaluating registration box and sign design on the basis of these four separate approaches greatly increased the confidence in our available evidence. At this point some general conclusions are possible.

The book-type box seemed to be slightly better than the card-type box for obtaining number of group visits and individual visits to the two study areas. Apparently, the easily perused books did represent an attraction not quite as apparent with the more secretive card-type box. It is important to realize, though, that both types of boxes obtained a generally satisfactory response. Of the 94 groups interviewed, 82 percent of the groups exposed to the book-type box and 74 percent of the groups exposed to the card-type box were registered.

The evidence for differences between signs also accumulated in a consistent way but, perhaps, with some disturbance of the traditional conceptions of "good" sign wording. The somewhat sketchy evidence from the interview sample survey for the superiority of the more firmly worded signs was enhanced by analysis of the performance of trail users who did stop at the stations. Although sign tone apparently did not differentially influence the number of groups that stopped to register, it did seem to influence their performance after stopping. More persons registering at the mildly soliciting signs failed to complete all the key items or to complete them accurately; more innocuous nonconstructive comments also appeared. Of the two more firmly worded signs, the one that provided reasons for registering resulted in fewer errors and less "junk."

In none of the analyses was the mild sign better than either of the more firmly worded signs. In most of the analyses, it was clearly inferior. Of the two signs which firmly stated that "all parties must register," the one which followed with reasons for registering produced the best results.

In sum, the weight of the evidence of 1961 indicated that one box design was about as effective as the other. The choice of box type (and the system of form handling represented by it) could reasonably be based on factors other than effectiveness in obtaining satisfactory

response. However, sign design did seem to affect responses at stations—the firmly toned sign with reasons for registering being most effective. Apparently, the best public response and respect at unmanned registration stations, as perhaps in other situations requesting public cooperation, is obtained not by being meek but rather by more adequately fulfilling the role expected by the public of its "forest rangers," that is, by being firm though reasonable.

Effectiveness of 1962 Design Modifications

The registration station design was modified in 1962 on the basis of 1961 tests. (These modifications were described on page 13.) The design modifications were evaluated by comparing 1962 sampled response with that in 1961 on all designs except the worst one (sign 1, box 1). Comparisons of groups and individuals registered in hiking and riding groups are shown in tables 14 and 15. The 1962 data does not include any interviews with pack-station groups.

Chi-square analyses of data on number of groups registered were made to determine if differences between years could be considered

Table 14.—Registration rate of sampled hiking and riding groups, by year

	Item	Hiking	Riding	Total
1961	Actal number	65	[1]16	81
	Registered number	62	6	68
	Percent registered	95.4	37.5	84.0
1962	Actual number	135	11	146
	Registered number	106	4	110
	Percent registered	78.5	36.4	75.3

[1] Includes three parties totaling eight persons riding on or in a motorcycle, two trail scooters, and a jeep.

Table 15.—Accuracy of the number of individuals registered in sampled hiking and riding groups, by year

	Item	Hiking	Riding	Total
1961	Actual number	252	[1]65	317
	Registered number	198	39	237
	Percent registered	78.6	60.0	74.8
1962	Actual number	523	43	566
	Registered number	399	17	416
	Percent registered	76.3	39.5	73.5

[1] Includes three parties totaling eight persons riding on or in a motorcycle, two trail scooters, and a jeep.

significant, allowing a 5-in-100 or less chance for random sampling errors. The data on number of individuals registered were not suitable for chi-square analysis because of correlation between groups registered and numbers of individuals registered by group leaders.

The difference in total number of groups registered is not significantly different between 1961 and 1962 (chi-square: 1.80, 1 d.f., $0.20 > P > 0.10$). Although it appears from percentage comparisons that response in 1962 was not quite as good as 1961, the overall percentage difference could have occurred more than 5 in 100 times merely by chance. However, a chi-square analysis of registration rate of hiker groups indicated a significant difference between years; hiker-group responses in 1962 were poorer than in 1961 (chi-square: 8.07, 1 d.f., $0.01 > P > 0.001$). There was obviously no difference in registration rate of rider groups between years.

In an inspection of the number of individuals registered in groups, it seemed apparent that the differences in total sampled response and hiker-group response between years were clearly not significant. The large difference in percent of riders registered was directly the result of one large group registering and was treated as a chance occurrence.

Why was group registration response from hiking parties seemingly poorer in 1962? An examination of table 16 provided a clue. From the table, it appeared that fewer single-person parties registered in 1962 than 1961. Analysis using a Fisher exact probability test[11] confirmed this at the 5-percent level. It was also apparent that in 1961 more parties, especially large ones, were registered by more than one person (although number of individuals registered by each registrant did not usually include all members of the party). Consequently, the higher percentage of groups registered in 1961 resulted from (1) registration by a larger proportion of very small parties and (2) multiple registration by three large parties. These facts explain why the percentage of individuals registered was

[11] See Siegel, p. 96 (footnote 8).

about the same from one year to the next for hikers, even though the percentage of groups registering changed. The lower response in 1962 seemed most attributable to the lower rate of multiple registration by large groups—an improvement in quality of response which may have resulted from increased clarity in sign wording in 1962. We were unable to explain why the significantly lower rate of response by single-person parties occurred. Fortunately, the poorer response by single-person parties did not have noticeable numerical effect on use estimates made from registration information.[12]

Our major conclusions from the statistical analyses about station design are:

1. The design of signs eliciting prescribed response was a significant element influencing the effectiveness of unmanned registration stations. A direct, firmly toned sign that stated a reasonable purpose for registering was most effective.
2. A box design permitting public inspection of prior registrations is not much more or less effective than one which keeps registrations from public view, although the former design may have attracted a slightly higher rate of registration. A conspicuous map mounted with the boxes designed to keep registrations private increased the apparent attraction of this box design.
3. Hiker groups registered at a much higher rate than horseback groups; however, the registration rate stability and number of horseback registrations was adequate to permit estimates of actual horseback visits, as well as hiker visits, from registrations.

In the next sections, we discuss our other observations on the design of stations and also consider other factors relevant to their use.

[12] Use estimates will be presented in a later report.

Table 16.—Registration rate of sampled hiker groups, by party size for 1961 and 1962[1]

Party size	1962			1961		
	Actual number of groups	Groups registered	Percent registered	Actual number of groups	Groups registered	Percent registered
1	4	4	100.0	10	3	30.00
2	22	17	77.3	39	30	76.92
3	14	10	71.4	21	18	85.71
4	10	10	100.0	28	[2]23	82.14
5-7	9	[2]10	111.1	29	26	89.66
8+	6	[2]11	183.3	8	6	75.00
Total	65	62	--	135	106	--

[1] Data for the same groups as reported in table 14.
[2] One or more groups of this party size was registered by more than one group member.

Observations of Design, Location, and System of Use

The previous chapter presented formal statistical comparisons of some station design variations. In this chapter, we discuss our nonstatistical observations of design, location, and system for use of stations.

General Station Design

The two features of station design (box type and sign tone) analyzed statistically were not the only features of importance. Other features included general sign design, box construction, and accessories to facilitate registration.

Toward the end of the 1961 season and after, we conversed with trail users for their impressions of the station design. These conversations reinforced our season-long observations. Although several trail users we talked to had passed various designs of the stations, usually only the variation in design of the box was remembered. The reason was readily discernible; after the first encounter with a station, the sign usually was not consciously read again.

We wished only one person to register for each party. It was somewhat difficult to convey the idea of "party" and "group" being any party of one or more persons. We deliberately used both words "party" and "group" on the signs in 1961, hopefully providing a general enough stimulus to convey the idea one way or the other; this scheme seemed to work well. Difficulties of interpretation arose largely from the double term "group leader." This seemed to imply a formally structured group. We depended on the tendency in small, informal groups for some person to step forward in the role of leader when a situation required one. Although this usually happened, confusion was apparent even in some well-structured family groups who were not sure if they were a "group" as implied by the term "group leader." This problem of communicating who and how many were to register from each group was resolved with apparent success in 1962. The instructions about "who and how many" read simply, "One person from each party register . . . "

All our other experience in the study also indicated that sign wording was critical in providing (1) motivation and (2) explicit, clear instructions. Because many persons merely glanced at the sign again after the first time, extreme brevity of wording seemed necessary to make any impact on repeat visitors. This need for brevity increased the problem of sign wording and made it the chief problem of station design.

We observed that many trail users seemed to become absorbed in their thoughts while traveling and often looked only at the trail when they were hiking. Inconspicuous signs were frequently not seen. Consequently, although registration stations should be harmonious with the wilderness environment, at least the signs must be conspicuous enough to attract the attention of trail users.

The maps mounted above registration boxes in 1962 were observed to be highly popular. Aside from the attraction they lent to stations, the service they provided the public seemed well appreciated. We used the best maps of the local area obtainable at a scale of either one-half inch or 1 inch to the mile.

Maps were securely fastened with a staple gun to backing boards by spacing staples about 3 inches apart across the surface of the map. Because maps were laminated in 10-mil plastic, attempts to remove them usually would crack them up—a factor which seemed to discourage most tentative removal attempts. However, if the staples used were not long enough to set

tightly, some persons would eventually pry them all out to obtain the map.

Few maps were stolen or damaged during the summer season. A somewhat higher loss rate occurred during the hunting season. Perhaps rate of map loss at stations could be reduced by making high quality maps more readily available to recreationists, especially hunters, who need one with them when in the backcountry.[13]

After stopping at stations, trail users were cogently instructed about registration steps by small aluminum, embossed signs on the boxes and by brief instructions on the cards. These were in lieu of a separate board or list of consolidated instructions. These brief instructions, at the places needed as a person went through the tasks, produced good results.

In 1961, two ballpoint pens were chained to each station and a pencil was placed inside each box to facilitate registration. Initially, vandalism of pens was expected to be a sizable problem; it was not. In 1962, only one pen was chained to each station in addition to the pencil inside; this system seemed as adequate as in 1961. Pens and pencils were difficult to keep on some stations, but not on most. The rate of loss seemed directly related to the differences in characteristics of the users on different trails, rather than to the volume of use per se.

In preliminary tests of writability, the ballpoint pens were clearly superior to pencils for writing on wet forms;[14] consequently, pens were the preferred writing instrument. The objective of having both pen and pencil was to have something left if one was stolen. Contrary to expectation, the pencil was often taken and the pen left, perhaps because registrants forgot that the pencil belonged at the station.[15]

During very wet weather, it was discovered that neither the pens nor pencils would write on the wet forms. Failure of both instruments resulted in a number of frustrated registrants, as seen by the attempted registrations. In 1962, the problem was solved by providing a special pencil—an ink or copying pencil. These pencils resulted in readable, though messy, registrations in extremely wet weather. Pens were still provided because, unless weather was extremely wet, resulting registrations were generally much more readable.

Although the small plastic calendars mounted under box lids were visible when boxes were opened, they frequently were not noticed and gross errors in dates occurred. These errors were more frequent with card-type boxes which had lids that would not open fully. In 1962, calendars were placed on top of the lids of the card-type boxes. Wallet-size plastic calendars were large enough to be readily seen when on top, but not so large as to detract from the general neat appearance of the station.

The card-type boxes were considerably easier to construct and mount securely than the book-type boxes. Forms were easier to load into the boxes and to handle during registration and when coding for analysis. Card-type boxes of a given bulk held forms for several times more potential registrations than did book-type boxes.[16]

Location of Stations

Stations were located in cordon fashion on the perimeter of the study areas. Field experience with station installation revealed some pragmatic aspects of macro- and microlocation. As the terms are used here, macrolocation would be placement relative to an area as a whole, and microlocation, relative to any one trail.

MACROLOCATION

When we considered a system of stations that would cover all or most use on an area, two

[13] Maps of the study areas were not readily available. If available at all, they were usually at ranger or guard stations, which often were either far from the areas or unattended because the forest guards were working away from stations. Availability would be improved by (1) providing resorts and other local service establishments with maps for distribution and (2) placing maps in "take one" boxes at principal trailheads, guard stations, and campgrounds around a backcountry or wilderness area.

[14] Forms got wet when box lids were open to register.

[15] On the other hand, stations also accumulated an odd assortment of pencils left by registrants.

[16] We discovered this in lab tests of box-holding capacity. We assumed a looseleaf book arrangement essential for registration ease at book-type stations.

basic approaches seemed possible: (1) location of stations at trail junctions and other significant places on the interior of an area and (2) location of stations at trailheads on the perimeter of an area. Which approach was used seemed likely to influence both registration response and administrative cost of using stations. Although we tested the stations as located only on the perimeters of areas, it seemed, on the one hand, that interior locations would have but two advantages:

1. If stations were placed at natural rest places, momentum would be less of an obstacle to registration. Psychological momentum, that is, the motive force that keeps a body in motion toward a goal, is greatest with pack and saddle stock users. When a string of horses starts up a trail, both the people and the stock are set to go. The obstacle to registration is increased by the likelihood of stock milling around and getting twisted in lead ropes while someone registers.
2. Less vandalism would likely occur with interior locations because of removal from casual persons attracted to stations from roads or roadside campgrounds.

On the other hand, from our observations, perimeter location of stations seemed to have the following advantages:

1. Trail users were exposed to a station only when entering or leaving an area; confusion about when they were to register was minimal.
2. Registration was identified with actual entry into the backcountry and thereby gained symbolic significance.
3. All users of an area could be encountered more easily: persons going into an area only a short distance were covered; recreationists using an area were more likely to still be on a trail at the perimeter where the stations were than further in where many persons left trails.
4. Fewer stations were necessary to cover all areas of travel adequately.
5. Stations could be constructed with somewhat less concern for the rustic appearance that is desirable within areas. As a result, stations could be made conspicuous enough to be noticed by all travelers, and costs of construction were less than could be expected for construction from rustic materials.
6. Costs of regularly maintaining stations and retrieving data were lower because of less travel time than would have been necessary for interior stations.
7. Trail users recognized stations to be a means to locate them more readily in case of emergency.

The advantages of interior locations are, in converse, disadvantages of perimeter location. To minimize these disadvantages of perimeter location, registration stations were placed (1) at points where horses were saddled, packed, and/or mounted and (2) slightly up the trail from the trailheads where vandalism seemed a problem. In sum, the advantages of perimeter location of stations seemed to greatly outweigh those of interior location.

The principal obstacle to getting complete station coverage of the study areas was finding all access trails. Many trails used by recreationists were not officially on the Forest Service trail system. Some of these had been on the system in the past but were abandoned; some others had never been officially recognized or maintained. Some of these unofficial trails were very popular. These unofficial trails had to be covered if all use was to be censused. In some instances, shortcut routes bypassed principal trailheads; these also had to be adequately covered by registration stations.

Although Ranger District personnel had been contacted prior to the study, few of them seemed to know anything about the official trail system, and information about unofficial trails was almost nonexistent. We concluded that it would have been quite helpful to seek out recreationists in the local area who were highly familiar with the trails on an area of interest. In finding trails, a careful study of old maps of the area was as important as study of most recent ones. Aerial photos might have been helpful on some open parts of the areas. In addition, a careful

search of the perimeter for clues to additional access trails was necessary.

Coverage of nontrail[17] use was only a slight problem on the study areas. Steep topography, dense vegetation, and the wish to leave the perimeter environment quickly, kept almost all users of the areas on or along trails for at least a short distance into the area. But along the short stretch where the perimeter terrain was highly scenic, gentle, and with open or sparse vegetation, many recreationists did not use available trails, and effective coverage of use with stations became difficult. A heavy scattering of stations to cover most frequently traveled routes, natural constrictions in the routes, or usual parking spots is necessary where this latter type of terrain is to be covered.

MICROLOCATION

Wherever possible, registration stations were mounted on available stumps or trees. Stations mounted this way presented a neat and more rustic appearance than those mounted on posts. Mounting with appropriate backing boards and lag screws facilitated easy removal of stations without damage to either station equipment or trees. Very light brushing out was done when necessary to permit easy sighting and use of stations. When stumps or trees were not available at appropriate trailhead locations, a large post was firmly set. This latter procedure was sometimes very difficult in thin, rocky soil; nonetheless, a properly located post was preferable to a stump or tree in a poor place.

Not all trails were used by horseback riders, but for those that were, microlocation of stations was somewhat critical. To obtain maximum cooperation of horsemen, stations should be readily accessible to them before they mount for their trip. At the least, stations on horse-used trails should be directly at the trailhead, and supplementary stations may be necessary at other mounting points and shortcuts. Where groups from pack stations, or riding stables, use trails on an area, pack-station records might be requested that would provide needed information about horse parties.

Where horse use of a trail was not a factor to consider, an effective station location was much easier to find. Station location at the trailhead was ideal for hikers, primarily because the station became a symbol of entry into the backcountry and, therefore, a significant part of the trip, as was evidenced by group pictures being taken of the registration process. Occasionally it was necessary to retreat from vandals and move the station up the trail a short distance, out of view of casual road hikers or bored children from campgrounds adjacent to trailheads. But whether at the trailhead or up the trail a short distance, stations should be readily visible to a hiker as he looks up the trail without necessitating his looking to one side.

Stations along steep sections of trail discourage registration. Stations should be located at places where other members of the party, as spread out along the trail, may stop and stand easily while one party member registers. Locations should also permit registrants to stand conveniently while registering.

Methods of Station Use

It was decided that only one person per group should register. Having only one person per group register would obviously place the least burden of time and inconvenience on a group, and it would minimize "pileups" of the trail users at the stations. However, followup research on the group or its members would depend upon the willingness and ability of the group leader to provide information about group members when he was contacted later. This was tested in a separate substudy, and it was found that a 60-percent response was obtained to mail requests for names and addresses of party members.[18]

As requested by the signs, most groups were registered by only one person; however, exceptions did occur and were detected in the

[17] Any beaten path defined by human use was a "trail" for study purposes. Travel into an area cross-country from an access road, i.e., off any previously defined path, was called dispersed, or nontrail use.

[18] One followup request followed the initial request.

process of the interview sample survey and coding of registration data. The overall bias on number of calculated groups was, therefore, easily removed.

In 1961, parties were asked to register both when entering and leaving so that (1) an accurate record of actual length of visit and (2) frequency that trail users entered on one trail and left on another could be determined. Many persons were not willing to be twice troubled with complete registration on the same trip. Book registrants resolved the issue somewhat by writing "out," "leaving now," or some such indication on the entry registration form. But the procedure seemed to require more of registrants than was justified by the slight increase in quality of data obtained by the method. Also, data handling time and cost were greatly increased by the double-registration method. Accordingly, in 1962, parties were only asked to register when entering. Length-of-visit and destination information were asked directly of registrants. The 1962 method seemed to provide adequate information without so much trouble to both registrant and data analyst.

Conclusions

Major conclusions resulting from these observations are summarized as follows:

1. In addition to the effect apparent from the tone of station signs, sign wording was critical for providing positive motivation and cogent instructions for registering.
2. "Once read, never read again closely" expresses a response of many persons toward signs. We suspect that after the first reading, the impact gained in a glance must be sufficient to recall the sign's detailed message. Consequently, distractions unnecessary to the sign's intent should be avoided, and "register" should be the most apparent word at a glance.
3. Stations must be kept harmonious with the forest environment, but they must also be conspicuously attractive if they are to be noticed and used.
4. Maps above registration boxes seemed to help attract visitors to the station. This service seemed much appreciated.
5. Card-type boxes were more convenient administratively than book-type boxes.
6. Perimeter location of stations seemed overwhelmingly superior to interior location from the criteria of effective coverage of all area use, administrative efficiency, and other factors.
7. Registration stations were more difficult to place and less effective in covering use where the area perimeter was scenic, sparsely vegetated, and gentle in terrain.
8. Discovery of all access trails into a moderately large backcountry area requires considerable ingenuity and effort, but is important in initial studies if coverage is to be complete enough to derive sufficiently accurate use estimates for the area.
9. On trails that receive horse use, stations should be placed where riders can register before mounting.
10. Best cooperation of visitors and minimum data handling can be obtained without important loss of information if registration is requested but once per group and per visit.

Study Administration Costs

The administrative time and costs of using a system of unmanned registration stations will vary with the size of an area, number of access trails, accessibility to trailheads, intensity of trail use, size of interview sample needed to obtain data accuracy desired, and methods of data analysis. Consequently, the specific total time and cost estimates will be highly variable from place to place.

Detailed advanced planning is necessary (1) to obtain necessary Budget Bureau approval[19] of the registration forms and interview schedule, (2) to make most effective use of the short season common with most high-country areas, and (3) to schedule necessary data processing services.

Some additional comments are offered as assistance for future studies.

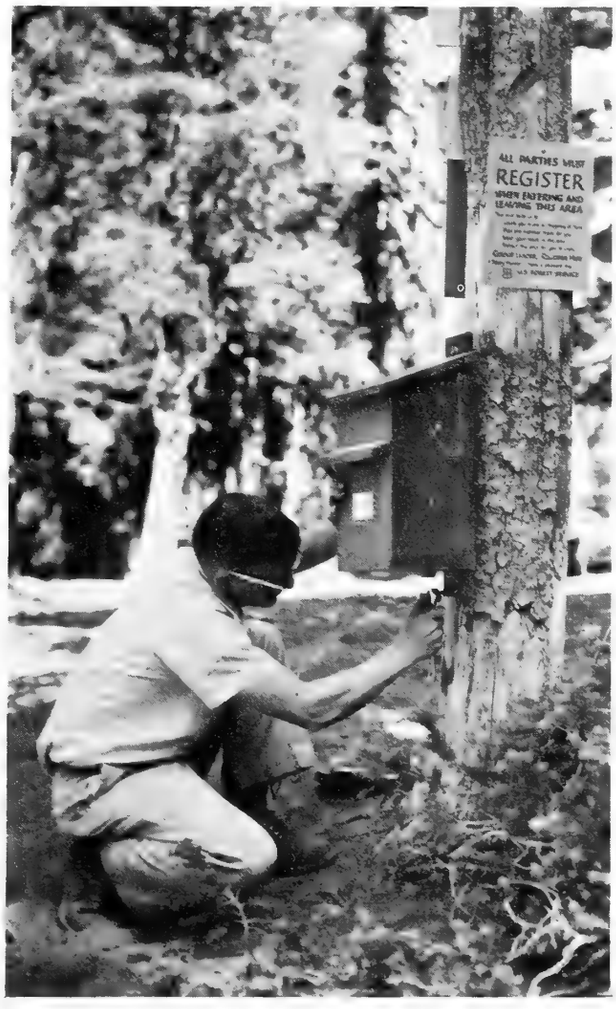
Installation, Maintenance, and Survey Costs

Registration stations cost a total of about $10 each before installation. Commercially bid and manufactured boxes cost about $7.50, and about $2.50 was needed for signs and accessories. Commercially printed forms were nominal in cost and could be serially numbered during printing or by IBM facilities.

Installation of each station—selection of microlocation, brushing out, mounting of station, loading forms, and preparing form record of installation—required a modal time of 45 minutes per station (fig. 10). If a post was needed for station mounting, the time of installation was considerably increased.

The need for servicing and maintenance of stations varied with intensity of trail use. During the recreation season, stations should be checked and serviced at least once a month. Trails with 1,000 or more visits per season need servicing every 2 to 3 weeks. Form handling, service-record preparation, and minor repair or replacement work required about 15 minutes per station per service call excluding travel time.

Figure 10.—Installation of stations required a modal time of 45 minutes each.



[19] As required under the Federal Reports Act of 1942 for most situations in which 10 or more persons are asked for the same information.

Travel time to install and maintain stations was highly variable, depending on access road location and conditions. For a large area with many stations and difficult access, helicopter transportation should be considered for feasibility in "making the rounds."

Stations may be left in place over winter without serious deterioration if strong enough to support the snow load and if constructed of thoroughly waterproof materials. Signs of high quality enamel on tempered hardboard and boxes made of marine plywood well sized before staining held up well. Restaining of boxes in the spring of each year would be desirable and easily done at the trail location.

Cost of equipment, installation, and maintenance of stations seemed entirely reasonable. By comparison with other equipment used to measure trail use, e.g., pneumatic pedestrian traffic counters, unmanned registration stations permit collection of more meaningful data on more trails for a given sum of money.

The interview sample survey necessary for interpreting and estimating use from registration data was the most expensive element in the system employing unmanned registration stations; however, similar surveys are also essential to proper use estimation that employs automatic, mechanical equipment. It is likely, though, that derived estimation factors could be used with a system of stations for 2 or 3 years before user characteristics would change significantly enough to necessitate a new sample survey. As will be described in a future report on survey methods, interviewing costs for a specific area and a given allowable sampling error can be estimated with considerable precision.

Data Handling Methods and Costs

Data handling and analysis were significant cost items in these studies and would be for most studies on areas with about 3,000 or more visits a year. For this volume of data or more, an edge-punch card system or automatic data processing seems essential. But the complexity of information desired from the data will largely determine the most feasible system.

Prior to developing the coding scheme, preliminary data objectives should be clearly stated, but these must remain flexible if fullest benefit is to be made of insights about interpretation of data gained during its collection. From our experience, it seems advisable to have the coding scheme devised at the beginning of a field season so that coding can start and keep pace with collection of station data.

In addition to coding and machine programming, the card punching, machine analyses, and tabulation for about 4,000 registered groups cost us about $1,000 for a moderately complex analysis. Card punching alone cost approximately $300.

It is recommended that in future studies an edge-punch card or similar semi-manual system be tested. With such a system, it might be possible to print registration forms directly on the special data processing cards and to use the field interviewers' spare time to code these cards directly in the field. With such a system, it might be possible to shortcut the coding-punching operations, thereby saving funds, reducing delay in reporting use, and keeping interviewers fully occupied.

Summary and General Conclusions

A 2-year test of effectiveness of unmanned registration stations was conducted on two wilderness-type areas in Oregon. Unmanned registration stations appear to have considerable potential for obtaining information about wilderness use. Such information is needed for immediate management purposes and for additional research helpful to allocation of land, the shaping of management goals, and long-range planning.

The major components of stations were the sign announcing the station and providing general instructions, the box containing registration forms, the forms for registration, and accessories including pen and calendar.

This first report on the study evaluates and discusses the effective design, location, and prescribed system of use of registration stations on wilderness areas. Additional reports to follow will describe interview survey sample methods essential to use estimation from stations, biases in "raw" data from stations, and the 1961 and 1962 recreation use on the study areas.

Interview sample surveys of trail users and user responses at stations were used to obtain criteria of the effectiveness of stations. Six station design variations were compared for effectiveness in 1961, and one design was tested in 1962 using statistical techniques. In addition, nonstatistical systematic observations were used to evaluate other factors about design, location, and system of station use.

Detailed conclusions are reported throughout the report. Our general conclusions are as follows:

1. Unmanned registration stations can be used effectively and efficiently to obtain much information from wilderness trail visitors about the objective details of their groups and visits.
2. The average rate of registration was between 70 and 85 percent. Horseback visitors registered at a much lower rate, but in sufficient numbers and at a constant enough rate for adequate use estimation to be possible.
3. The most effective sign wording for attracting, motivating, and instructing potential registrants seemed to be brief, cogent, and firmly toned, with a short reason for registering.
4. A box design permitting public view of completed registrations seemed to attract a slightly higher percentage of trail users, but higher quality registrations tended to be obtained with box designs protecting registrations from perusal. The latter box design was the more convenient to build and mount, it held forms more efficiently, and the forms were easier to handle.
5. Perimeter locations of stations at all trailheads into an area resulted in more effective coverage of area use and higher administrative efficiency than seemed possible with interior locations.
6. Registration stations were least effective for covering area use where the perimeter was scenic, sparsely vegetated, and of gentle terrain.
7. The best system of prescribed registration requested each party to register but once per trip. Only one person per party was to do the job.
8. In total, employment of unmanned registration stations resulted in collection of more meaningful data at less total cost than seemed possible using other equipment, such as automatic pedestrian traffic counters.
9. This system, as well as other systems to measure trail or area use, depends on supplementary application of sound sample survey techniques as a basis for developing use estimates and interpreting information obtained with the unmanned equipment.

APPENDIX A

Principal Recognizable Features of Forest Service Wilderness-Type Areas

1. Acreage—

   Wild areas from 5,000 to 99,999 acres.

   Wilderness areas are 100,000 acres or more.

   Primitive areas are 5,000 acres or more.

2. Development—

   Roads are generally excluded except for private roads legally necessary for access to private inholdings, to valid mining claims, or to water development sites.

   Lookout towers and rudimentary campsite developments are permissible.

   Minor water development projects are permitted.

   Primitive and semi-primitive developments are permitted when necessary for protection of camping sites and associated areas.

   Trails are permitted.

3. Equipment restrictions—

   No motor vehicles, either land, air, or water, are permitted, with certain exceptions for administrative or emergency purposes.

   Chainsaws, power generators, and similar motor-driven devices are not permitted except for administrative purposes.

4. Uses—

   Timber cutting is not permitted and usually has never been done on the areas.

   Grazing is permitted where established.

   Prospecting is permitted.

   Water yield is usually a principal concrete value of the areas.

   Recreation and scientific study are encouraged.

APPENDIX B

Interview Schedules

1961

Budget Bureae No. 40-613
Approval expires 6/30/6

FIELD INTERVIEW QUESTIONNAIRE

Wilderness-Use Study

Instructions to interviewer:

1. This form is to be filled out by you. Do not give it to the interviewee to fill out by himself. However, if an interviewee wishes to look at the form, it is permissible for him to do so.
2. Read to the interviewee only the capitalized wording.
3. Count for yourself the number of persons and number of pack and saddle stock.
4. Read the detailed instructions for interviewers.

HELLO. I'M MAKING A SURVEY OF TRAIL USERS. WHICH PERSON IS THE GROUP LEADER? (Go to the designated person).

HELLO. I'M (your name) . I'M WITH THE U.S. FOREST SERVICE. WE'RE MAKING A ROUTINE SURVEY OF TRAIL USERS. INFORMATION YOU GIVE ME WILL HELP THE FOREST SERVICE MEET THE NEED FOR TRAILS AND OTHER FACILITIES IN THIS AREA.

WHERE DO YOU LIVE? _____
(City and State)

HOW DO YOU SPELL YOUR NAME? _____

WHAT IS YOUR ADDRESS IN (name of city)? _____

HOW LONG DO YOU EXPECT TO STAY IN THIS AREA BEFORE ARRIVING BACK AT A ROAD?

- ☐ less than 1 day
- ☐ overnight to 3 days
- ☐ 4 to 7 days
- ☐ 8 days to 2 weeks
- ☐ over 2 weeks

HAVE YOU TRAVELED TRAILS IN THIS AREA BEFORE? ☐ no ☐ yes
(if "yes", ask) THIS YEAR? ☐ no ☐ yes

THANK YOU VERY MUCH FOR YOUR HELP. HAVE A GOOD TRIP!

Total number of persons in group? ☐

Total number of pack and saddle stock? ☐

(check one) ☐ walking ☐ riding horses ☐ other _____ (specify)

Interview date _____ Time ____ ☐ a.m. ☐ p.m.

Trail No. _____.

Interviewer's initials _____.

Budget Bur.No. 40-6134A
Approval expires 6/30/63

1962

FIELD INTERVIEW QUESTIONNAIRE
(Revised Form)

Wilderness-use Study Form A (Entering)

INTERVIEWER: Only you are to fill this out! Read detailed instructions before beginning. Questions 1-11 refer to interviewee only.

HELLO. I'M MAKING A SURVEY OF TRAIL USERS. WHICH PERSON IS THE GROUP LEADER? (Go to designated person)

I'M (interviewer's name). I'M WITH THE U.S. FOREST SERVICE. I'M GATHERING INFORMATION THAT WILL HELP THE FOREST SERVICE MEET YOUR CHANGING NEEDS FOR TRAILS AND OTHER FACILITIES IN THE AREA.

1. (A) HAVE YOU EVER TRAVELLED TRAILS IN THIS AREA BEFORE?
☐Yes
(if yes, ask):
☐No (if no, skip to question 3)

(B) EARLIER THIS YEAR?
☐Yes
(if yes, ask):
☐No (if no, skip to question 2)

(C) WHICH TRAILS WERE YOU ON THIS YEAR? _____

2. ABOUT HOW OFTEN HAVE YOU USED TRAILS IN THIS AREA PREVIOUS TO THIS YEAR? (Probe for both years and times)

Years:	Times:
☐1 year	☐1 time
☐2 years	☐2 times
☐3-5 years	☐3-5 times
☐6-10 years	☐6-10 times
☐More than 10 years	☐More than 10 times

3. HOW DID YOU HAPPEN TO PICK THIS PARTICULAR AREA FOR YOUR TRIP RATHER THAN SOME OTHER?
☐Friends told us about it
☐Close to home
☐Found it by chance
☐Been here before and liked it
☐Other: _____

4. (A) ARE YOU A MEMBER OF AN OUTDOOR CLUB?
☐Yes
(if yes, ask):
☐No (if no, skip to question 5)

(B) WHICH ONE? _____

(C) IS THIS TRIP SPONSORED BY YOUR CLUB?
☐Yes ☐No

5. HOW LONG DO YOU PLAN TO STAY IN THE AREA BEFORE GETTING BACK TO THE ROAD?
☐Less than 1 day
☐Overnight to 3 days
☐4-7 days
☐8 days to 2 weeks
☐Over 2 weeks

6. HOW MANY MILES DO YOU PLAN TO GO INTO THE AREA THIS TIME?
   ☐Less than 1 mile ☐4-10 miles
   ☐1 mile to 3 miles ☐More than 10 miles

7. WHERE IN THE AREA DO YOU PLAN TO GO? _____

8. WHERE IS YOUR HOME? (city & state) _____

9. WHAT IS YOUR ADDRESS IN (name of city)? _____

10. HOW DO YOU SPELL YOUR NAME? _____

11. WHAT IS YOUR OCCUPATION? _____

12. (A) BY WHAT MEANS OF TRAVEL DID YOU ARRIVE AT THE BEGINNING OF THIS TRAIL?
    ☐Motor vehicle
    (if motor vehicle, ask):
    ☐Other(what?): _____
    (skip to question 13)

    (B) DID YOUR PARTY ARRIVE IN MORE THAN ONE VEHICLE?
    ☐Yes
    (if yes, ask):
    ☐No
    (if no, ask):

    (C) (1) WHAT ARE THE NAMES OF THE OWNERS?
    ☐Registrant owns one
    ☐Other owners(names):
    _____
    _____

    (2) DOES THE VEHICLE BELONG TO YOU?
    ☐No
    ☐Yes
    (skip to 12)

    (3) WHAT IS THE OWNER'S NAME?
    _____

13. WHAT IS THE MAJOR PURPOSE OF THIS TRIP?
    ☐Recreation(what?): _____ ☐Work(what?): _____

14. DO YOU HAVE ANY FURTHER COMMENTS ABOUT THIS AREA? (Write key words to remarks at time of interview. Detail remarks after interview).

THANK YOU FOR YOUR HELP. HAVE A GOOD TRIP.

15. ☐Total number of persons in group
16. ☐Total number of pack stock
17. ☐Total number of riding stock

18. Recreation equipment visible: _____
_____

19. Age and sex distribution of group:
____females older than 12
____females younger than 12
____males older than 12
____males younger than 12

Interview date: _____ Interview time: _____ a.m. p.m. Trail Number: _____

Trail Name: _____ Interviewer's initials: _____

Interviewer: Make additional comments on back!

1962

FIELD INTERVIEW QUESTIONNAIRE
(Revised Form)

Wilderness-use Study Form B (Leaving)

INTERVIEWER: Only you are to fill this out! Read detailed instructions before beginning. Questions 1-11 refer to interviewee only.

HELLO. I'M MAKING A SURVEY OF TRAIL USERS. WHICH PERSON IS THE GROUP LEADER? (Go to designated person)

I'M (interviewer's name) . I'M WITH THE U.S. FOREST SERVICE. I'M GATHERING INFORMATION THAT WILL HELP THE FOREST SERVICE MEET YOUR CHANGING NEEDS FOR TRAILS AND OTHER FACILITIES IN THE AREA.

1. (A) HAVE YOU EVER TRAVELLED TRAILS IN THIS AREA BEFORE THIS TRIP?
☐Yes (if yes, ask):
☐No (if no, skip to question 3)

(B) EARLIER THIS YEAR?
☐Yes (if yes, ask):
☐No (if no, skip to question 2)

(C) WHICH TRAILS WERE YOU ON THIS YEAR BEFORE THIS TRIP? _____

_____

2. ABOUT HOW OFTEN HAVE YOU USED THE TRAILS IN THIS AREA PREVIOUS TO THIS YEAR? (Probe for both years and times)

Years:	Times:
☐1 year	☐1 time
☐2 years	☐2 times
☐3-5 years	☐3-5 times
☐6-10 years	☐6-10 times
☐More than 10 years	☐More than 10 times

3. HOW DID YOU HAPPEN TO PICK THIS PARTICULAR AREA FOR YOUR TRIP RATHER THAN SOME OTHER?
☐Friends told us about it
☐Been here before and liked it
☐Close to home
☐Other: _____
☐Found it by chance

4. (A) ARE YOU A MEMBER OF AN OUTDOOR CLUB?
☐Yes (if yes, ask):
☐No (if no, skip to question 5)

(B) WHICH ONE? _____

(C) IS THIS TRIP SPONSORED BY YOUR CLUB?
☐Yes
☐No

5. HOW LONG HAVE YOU BEEN IN THE AREA AWAY FROM ROADS?
☐Less than 1 day
☐8 days to 2 weeks
☐Overnight to 3 days
☐Over 2 weeks
☐4-7 days

6. (A) WHERE DID YOU ENTER THIS AREA? (probe) _____

(B) ARE ALL MEMBERS OF YOUR STARTING PARTY HERE WITH YOU NOW?
☐Yes ☐No. (probe) No. entering: _____

7. WHERE IN THE AREA DID YOU GO? _____

8. WHERE IS YOUR HOME? (city & state) _____

9. WHAT IS YOUR ADDRESS IN (name of city)? _____

10. HOW DO YOU SPELL YOUR NAME? _____

11. WHAT IS YOUR OCCUPATION? _____

12. (A) BY WHAT MEANS OF TRAVEL DID YOU ARRIVE AT THE POINT WHERE YOU ENTERED THIS AREA?
☐Motor vehicle
(if motor vehicle, ask):
☐Other (what?): _____
(Skip to question 13)

(B) DID YOUR PARTY ARRIVE IN MORE THAN ONE VEHICLE?
☐Yes
(if yes, ask):
☐ No
(if no, ask):

(C) (1) WHAT ARE THE NAMES OF THE OWNERS?
☐Registrant owns one
☐Other owners (names):
_____
_____

(2) DOES THE VEHICLE BELONG TO YOU?
☐No ☐Yes
(skip to 12)

(3) WHAT IS THE OWNER'S NAME?
_____

13. WHAT WAS THE MAJOR PURPOSE OF THIS TRIP?
☐Recreation (what?): _____ ☐Work (what?): _____

14. DO YOU HAVE ANY FURTHER COMMENTS ABOUT THIS AREA? (Write key words to remarks at time of interview. Detail remarks after interview).

THANK YOU FOR YOUR HELP. HAVE A GOOD TRIP HOME.

15. ☐ Total number of persons in group
16. ☐ Total number of pack stock
17. ☐ Total number of riding stock.
18. Recreation equipment visible: _____
_____

19. Age and sex distribution of group
____females older than 12
____females younger than 12
____males older than 12
____males younger than 12

Interview date: _____ Interview time: _____ a.m. p.m. Trail Number: _____

Trail Name: _____ Interviewer's initials: _____

Interviewer: Make additional comments on back!

APPENDIX C

1962 Registration Card Designs

REGISTRATION CARD

ONLY ONE person from each group please answer ALL questions.

Your Name: _____

Street/Box: _____

City & State: _____

Date: _____ Time: _____ a.m. p.m.

The number of persons in your group
12 years and older? _____
Younger than 12 years? _____

Did you arrive at the start of this trail in your own vehicle?
☐ Yes.
☐ No. Name of vehicle owner: _____

About how long will you be away from roads on this trip? ___ days (___ hours)

How will you travel in the area:
☐ Walking
☐ Riding horses (how many?) _____
☐ Other (what?) _____

How many pack animals? _____

The purpose of this trip is:
☐ Recreation (what?) _____
☐ Work (what?) _____

How far into the area are you going?
☐ Less than 1 mile
☐ 1 to 3 miles
☐ 4 to 10 miles
☐ More than 10 miles

Destination in area: _____

BUDGET BUREAU NO. 40-6235
APPROVAL EXPIRES 6/30/63

№ 7114

PACK STATION REGISTRATION CARD

ONE member of each group please answer ALL questions. Put in registration box.

Your Name: _____

Street/Box: _____

City & State: _____

Date: _____ Time: _____ a.m. p.m.

The number of persons in your group
12 years and older? _____
Younger than 12 years? _____

About how long will you be away from roads on this trip? ____ days (___ hours)

How will you travel in the area:
☐ Walking
☐ Riding horses (how many?) _____
☐ Other (what?) _____

How many pack animals? _____

The purpose of this trip is:
☐ Recreation (what?) _____
☐ Work (what?) _____

How far into the area are you going?
☐ Less than 1 mile
☐ 1 to 3 miles
☐ 4 to 10 miles
☐ More than 10 miles

Destination in area: _____

BUDGET BUREAU NO. 40-6236
APPROVAL EXPIRES 6/30/63

№ 11646

APPENDIX D
1961 Interview Sample Survey Analyses Summaries

Group Registration Errors

The occurrence of errors and the results of the Kruskal-Wallis test[20] are reported in tables 17 to 37. As an example of the ranking prior to the computation of H, ranked error scores of all planned interview groups are shown in table 17 for the analysis of box differences.

1. Analyses of group errors of all planned interview groups:

Table 17.—Ranked group error scores of all planned interview groups by types of box

Error score	Number of groups (n_1)	Rank score (R)	Box 1 (Card type)		Box 2 (Book type)	
			(n_1)	(Rn_1)	(n_2)	(Rn_2)
0	38	19.5	9	175.5	29	565.5
1	15	46.0	9	414.0	6	276.0
Total	53	--	18	589.5	35	841.5

H (corrected for ties): 6.010, 1 d.f., $0.02 > P > 0.01$.

It was concluded that box 2, the book-type box, yielded fewer group errors than box 1, the card-type box.

Table 18.—Group error score distribution by signs for all planned interview groups

Error score	Number of groups (n)	Sign 1 (n_1)	Sign 2 (n_2)	Sign 3 (n_3)
0	38	11	18	9
1	15	6	4	5
Total	53	17	22	14

H (corrected for ties): 1.67, 2 d.f., $0.50 > P > 0.30$.

It is concluded that no evidence was provided here that one sign yields more group errors than another.

[20] Siegel, p. 312 (footnote 8).

Table 19.—Group error score distribution by blocks for all planned interview groups

Error score	Number of groups (n)	Block I (n_1)	Block II (n_2)
0	38	30	8
1	15	8	7
Total	53	38	15

H (corrected for ties): 3.227, 1 d.f., $0.10 > P > 0.05$.

It was concluded that block II was a suitable area for replication of the experiment on block I.

2. Analyses of group errors of planned interview groups without repeater groups:

Table 20.—Group error score distribution by boxes for planned interview groups without repeater groups

Error score	Number of groups (n)	Box 1 (n_1)	Box 2 (n_2)
0	30	8	22
1	7	5	2
Total	37	13	24

H (corrected for ties): 4.712, 1 d.f., $0.05 > P > 0.02$.

It was concluded that box 2 yielded fewer group errors than box 1.

Table 21.—Group error score distribution by signs for planned interview groups without repeater groups

Error score	Number of groups (n)	Sign 1 (n_1)	Sign 2 (n_2)	Sign 3 (n_3)
0	30	9	15	6
1	7	5	1	1
Total	37	14	16	7

H (corrected for ties): 4.087, 2 d.f., $0.20 > P > 0.10$.

It was concluded that no evidence is provided here that one sign yielded more group errors than another.

3. Analyses of group errors of planned and special interview groups without repeater groups:

Table 22.—Group error score distribution by boxes for planned and special interview groups without repeater groups

Error score	Number of groups (n)	Box 1 (n_1)	Box 2 (n_2)
0	47	13	34
1	12	7	5
Total	59	20	39

H (corrected for ties): 2.86, 1 d.f., $0.10 > P > 0.05$.

It was concluded that no evidence was provided here that one box yielded more group errors than the other.

Table 23.—Group error score distribution by signs for planned and special interview groups without repeater groups

Error score	Number of groups (n)	Sign 1 (n_1)	Sign 2 (n_2)	Sign 3 (n_3)
0	47	10	19	18
1	12	7	3	2
Total	59	17	22	20

H (corrected for ties): 5.28, 2 d.f., $0.10 > P > 0.05$.

It was concluded that no evidence was provided here that one sign yielded more group errors than another.

Individual Registration Errors

Each group interviewed was given an error score on the basis of the number of individuals inaccurately registered by the group. This error score was determined by dividing the number of individuals inaccurately registered by the total number of individuals in the group. (Inaccuracies caused by failure of a group to register were counted on the same basis as inaccurate numbers reported by registered groups). Therefore, each group's error score was independent of other groups, and a correction was automatically made for the varying numbers of individuals in groups. Groups were ranked according to error scores, and comparisons between boxes, signs, and blocks were made using the Kruskal-Wallis test.

1. Analyses of individual errors of all planned interview groups:

Table 24.—Individual error score distribution by boxes for all planned interview groups

Error score	Number of groups (n)	Box 1 (n_1)	Box 2 (n_2)
0.00	34	8	26
.25	1	0	1
.50	1	0	1
1.00	17	10	7
Total	53	18	35

H (corrected for ties): 5.375, 1 d.f., $0.05 > P > 0.02$.

It was concluded that the occurrence of individual errors was significantly greater for box 1 than box 2.

Table 25.—Individual error score distribution by signs for all planned interview groups

Error score	Number of groups (n)	Sign 1 (n_1)	Sign 2 (n_2)	Sign 3 (n_3)
0.00	34	8	17	9
.25	1	1	0	0
.50	1	0	1	0
1.00	17	8	4	5
Total	53	17	22	14

H (corrected for ties): 3.74, 2 d.f., $0.20 > P > 0.10$.

It was concluded that no one sign yielded significantly greater registration errors than another sign.

Table 26.—Individual error score distribution by blocks for all planned interview groups

Error score	Number of groups (n)	Block I (n_1)	Block II (n_2)
0.00	34	26	8
.25	1	1	0
.50	1	1	0
1.00	17	10	7
Total	53	38	15

H (correction for ties unnecessary): 0.94, 1 d.f., $0.50 > P > 0.30$.

It was concluded that block I did not yield significantly more individual errors than block II.

2. Analyses of individual errors of planned interview groups without repeater groups:

Table 27.—Individual error score distribution by boxes for planned interview groups without repeaters

Error score	Number of groups (n)	Box 1 (n_1)	Box 2 (n_2)
0.00	26	7	19
.25	1	0	1
.50	1	0	1
1.00	9	6	3
Total	37	13	24

H (corrected for ties): 3.16, 1 d.f., $0.10 > P > 0.05$.

It was concluded that the occurrence of individual errors was not significantly greater for box 1 than for box 2.

Table 28.—Individual error score distribution by signs for planned interview groups without repeaters

Error score	Number of groups (n)	Sign 1 (n_1)	Sign 2 (n_2)	Sign 3 (n_3)
0.00	26	6	14	6
.25	1	1	0	0
.50	1	0	1	0
1.00	9	7	1	1
Total	37	14	16	7

H (corrected for ties): 8.099, 2 d.f., $0.02 > P > 0.01$.

It was concluded that different signs yielded significantly different numbers of individual errors.

Signs were compared in pairs. The results were as follows:

Sign 1, sign 2 —

H (correction for ties unnecessary): 4.74, 1 d.f., $0.05 > P$.

It was concluded that sign 1 yielded significantly more individual errors than sign 2.

Sign 2, sign 3 —

H: −0.02, 1 d.f., $P = 1.0$.

It was concluded that sign 2 did not yield a significantly different number of individual errors than sign 3.

Sign 1, sign 3 —

H (corrected for ties): 3.30, 1 d.f., $0.10 > P > 0.05$.

It was concluded that sign 1 did not yield a significantly greater number of individual errors than sign 3.

A conflict in conclusions is apparent. The overall analysis indicated a real difference between signs. But the paired comparisons left some doubt about the relative differences between signs. However, the weight of the evidence indicates that sign 1 yielded more individual errors than sign 2 or sign 3. And there is clearly no evidence of a real difference in occurrence of individual errors on sign 2 versus sign 3.

3. Analyses of special errors of planned and special interview groups without repeater groups:

Table 29.—Individual error score distribution by boxes for planned and special interview groups without repeater groups

Error score	Number of groups (n)	Box 1 (n_1)	Box 2 (n_2)
0.00	40	12	28
.25	1	0	1
.50	1	0	1
.67	1	0	1
1.00	16	8	8
Total	59	20	39

H (correction for ties unnecessary): 0.34, 1 d.f., $0.70 > P > 0.50$.

It was concluded that one box did not yield a significantly greater number of individual errors than the other box.

Table 30.—Individual error score distribution by signs for planned and special interview groups without repeater groups

Error score	Number of groups (n)	Sign 1 (n_1)	Sign 2 (n_2)	Sign 3 (n_3)
0.00	40	7	17	16
.25	1	1	0	0
.50	1	0	1	0
.67	1	0	0	1
1.00	16	9	4	3
Total	59	17	22	20

H (corrected for ties): 7.21, 2 d.f., $0.05 > P > 0.02$.

It was concluded that different signs yielded a significantly different number of individual errors. From inspection of the error score distribution it is apparent that sign 1 yielded a greater number of individual errors than either sign 2 or sign 3. The difference between sign 2 and sign 3 would not be significant.

Name-and-Address Errors

Name-and-address error scores were assigned to groups on the basis of the number of name-and-address errors contributed to the registration data by each group. The assigned error scores were ranked and the comparisons between errors on boxes, signs, and blocks were made with the Kruskal-Wallis test.

1. Analyses of name-and-address errors of all planned interview groups:

Table 31.—Name-and-address error score distribution by boxes for all planned interview groups

Error score	Number of groups (n)	Box 1 (n_1)	Box 2 (n_2)
0	36	8	28
1	16	10	6
2	1	0	1
Total	53	18	35

H (correction for ties unnecessary): 4.00, 1 d.f., $0.05 > P$.

It was concluded that box 1 yielded a significantly greater number of name-and-address errors than box 2.

Table 32.—Name-and-address error score distribution by signs for all planned interview groups

Error score	Number of groups (n)	Sign 1 (n_1)	Sign 2 (n_2)	Sign 3 (n_3)
0	36	9	18	9
1	16	7	4	5
2	1	1	0	0
Total	53	17	22	14

H (corrected for ties): 3.93, 2 d.f., $0.20 > P > 0.10$.

It was concluded that there was no significant difference in the number of name-and-address errors occurring on different signs.

Table 33.—Name-and-address error score distribution by blocks for all planned interview groups.

Error score	Number of groups (n)	Block I (n_1)	Block II (n_2)
0	36	29	7
1	16	8	8
2	1	1	0
Total	53	38	15

H (corrected for ties): 3.78, 1 d.f., $0.10 > P > 0.05$.

It was concluded that the number of name-and-address errors occurring on block I was not significantly different from that occurring on block 2.

2. Analyses of name-and-address errors of planned interview groups without repeater groups:

Table 34.—Name-and-address error score distribution by boxes for planned interview groups without repeater groups

Error score	Number of groups (n)	Box 1 (n_1)	Box 2 (n_2)
0	28	7	21
1	8	6	2
2	1	0	1
Total	37	13	24

H (corrected for ties): 4.33, 1 d.f., $0.05 > P > 0.02$.

It was concluded that box 1 yielded a significantly greater number of name-and-address errors than box 2.

Table 35.—Name-and-address error score distribution by signs for planned interview groups without repeater groups

Error score	Number of groups (n)	Sign 1 (n_1)	Sign 2 (n_2)	Sign 3 (n_3)
0	28	7	15	6
1	8	6	1	1
2	1	1	0	0
Total	37	14	16	7

H (corrected for ties): 8.06, 2 d.f., $0.02 > P > 0.01$.

It was concluded that the difference in number of name-and-address errors occurring on different signs was significant. Sign 1 obviously yielded more name-and-address errors than sign 2.

Paired comparisons were made between signs as follows:

Sign 1, sign 3—

H (corrected for ties): 2.46, 1 d.f., $0.20 > P > 0.10$.

It was concluded that sign 1 did not yield a significantly different number of name-and-address errors than sign 3.

Sign 2, sign 3—

H (correction for ties unnecessary): -0.06, 1 d.f., $P = 1.0$.

It was concluded that sign 2 did not yield a significantly different number of name-and-address errors than sign 3. A conflict in conclusions is again apparent. The overall analysis indicated a real difference between signs. But the paired comparisons left some doubt about the relative differences between signs. However, the weight of the evidence indicates that sign 1 yielded more name-and-address errors than sign 2 or sign 3, and there is clearly no evidence of a real difference in occurrence of name-and-address errors for sign 2 versus sign 3.

3. Analyses of name-and-address errors of planned and special interview groups without repeater groups:

Table 36.—Name-and-address error score distribution by boxes for planned and special interview groups without repeater groups

Error score	Number of groups (n)	Box 1 (n_1)	Box 2 (n_2)
0	42	12	30
1	16	8	8
2	1	0	1
Total	59	20	39

H (correction for ties unnecessary): 0.46, 1 d.f., $P = 0.50$.

It was concluded that box 1 did not yield a significantly different number of name-and-address errors than box 2.

Table 37.—Name-and-address error score distribution by signs for planned and special interview groups without repeater groups

Error score	Number of groups (n)	Sign 1 (n_1)	Sign 2 (n_2)	Sign 3 (n_3)
0	42	8	19	15
1	16	8	3	5
2	1	1	0	0
Total	59	17	22	20

H (corrected for ties): 6.38, 2 d.f., $0.05 > P > 0.02$.

It was concluded that the differences in occurrence of name-and-address errors between signs were significant. It is apparent from inspections that sign 1 yielded a greater number of name-and-address errors than sign 2 or sign 3. The difference between sign 2 and sign 3 would not be significant.

GPO 987-528

Wenger, Wiley D., Jr.

1964. A test of unmanned registration stations on wilderness trails: factors influencing effectiveness. U.S. Forest Serv. Res. Paper PNW-16, 48 pp., illus.

Unmanned registration stations, properly used, are effective in obtaining wilderness recreational-use information. In an intensive 2-year test of stations, the average registration rate was between 70 and 85 percent. The report evaluates and discusses effective design, location, and prescribed system for use of stations on wilderness trails. It seems that stations may yield more meaningful data at less cost than other unmanned devices.

GPO 987-528

Wenger, Wiley D., Jr.

1964. A test of unmanned registration stations on wilderness trails: factors influencing effectiveness. U.S. Forest Serv. Res. Paper PNW-16, 48 pp., illus.

Unmanned registration stations, properly used, are effective in obtaining wilderness recreational-use information. In an intensive 2-year test of stations, the average registration rate was between 70 and 85 percent. The report evaluates and discusses effective design, location, and prescribed system for use of stations on wilderness trails. It seems that stations may yield more meaningful data at less cost than other unmanned devices.

GPO 987-528

Wenger, Wiley D., Jr.

1964. A test of unmanned registration stations on wilderness trails: factors influencing effectiveness. U.S. Forest Serv. Res. Paper PNW-16, 48 pp., illus.

Unmanned registration stations, properly used, are effective in obtaining wilderness recreational-use information. In an intensive 2-year test of stations, the average registration rate was between 70 and 85 percent. The report evaluates and discusses effective design, location, and prescribed system for use of stations on wilderness trails. It seems that stations may yield more meaningful data at less cost than other unmanned devices.

GPO 987-528

Wenger, Wiley D., Jr.

1964. A test of unmanned registration stations on wilderness trails: factors influencing effectiveness. U.S. Forest Serv. Res. Paper PNW-16, 48 pp., illus.

Unmanned registration stations, properly used, are effective in obtaining wilderness recreational-use information. In an intensive 2-year test of stations, the average registration rate was between 70 and 85 percent. The report evaluates and discusses effective design, location, and prescribed system for use of stations on wilderness trails. It seems that stations may yield more meaningful data at less cost than other unmanned devices.

GPO 987-528